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ORGAN OF THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE AND THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

Editor—HENRY E. SIGERIST

Associate Editor—GENEVIEVE MILLER

VOLUME XX OCTOBER, 1946 NUMBER 3

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HERMANN BIGGS' CONTRIBUTION TO THE MODERN CONCEPT OF THE HEALTH CENTER

MILTON TERRIS

The health center in the United States has traditionally been limited to preventive functions. In general, although excellent examples to the contrary exist, the health center has remained isolated from the general hospital and the practice of medicine. While many cities and counties have erected modern hospitals which have become centers for the medical activities of the community, the health centers have too often been housed in city hall basements, old fire-houses, or nondescript buildings. They have provided well-baby, venereal disease and tuberculosis clinics, as well as office space for public health nurses, sanitary inspectors and health officers, but in most instances no attempt has been made to include therapeutic services or to integrate the preventive activities with community hospital and medical care functions.

There are numerous indications that a fundamental change is now taking place in our concept of the health center. One example is the recent competition sponsored by the magazine *Modern Hospital* for plans of a rural health center including a forty-bed general hospital as well as offices for physicians and dentists. The authors of the prize-winning design stated that " The medical officer who acts as administrator of the hospital is the county representative in charge of the health service for this particular section of the country," while the contest jury commented

that the plan " is well integrated with the various services of the hospital and the health center placed in proper relation to the scheme as a whole. The health department and the doctors' private offices are properly related to the adjunct diagnostic facilities." [1]

Another indication of the changing concept of the health center is the official statement on " Medical Care in a National Health Program," adopted October 4, 1944 by the American Public Health Association, which recommended that " The desirability of combining hospital facilities with the housing of physicians' offices, clinics, and health departments should be stressed." [2]

It is of some significance that the original draft of the Hill-Burton hospital construction bill, S. 191, introduced into the Senate on January 10, 1945, gave this definition of a health center: " The term ' public health center ' means a publicly owned facility for the provision of public health services and medical care, including related facilities such as laboratories, clinics, and administrative offices operated in connection with public health centers." [3]

The changing concept of the health center arises from several decades of experience in this and other countries, as well as the thinking of our ablest leaders in public health. The outstanding contribution to the development of the modern concept of the health center in the United States was made by Hermann M. Biggs a quarter of a century ago. That contribution has been described in detail by Dr. C.-E. A. Winslow in his biography of Biggs.[4] The purpose of this paper is to call the attention of health workers to Biggs' practical activities in this field, which are particularly significant because throughout his career he remained one of the most distinguished medical practitioners and consultants in this country, and to attempt an evaluation of his contribution from our present vantage point.

The influenza epidemic of 1918 focussed attention on the serious shortage of medical personnel and facilities in the rural sections of New York State. Hermann Biggs, then State Commissioner of Health, reported on the situation in his Annual Report for 1919, submitted April 12, 1920:

> Many communities have suffered during and since the war from lack of medical service. While this condition was alleviated to some extent by the return of medical

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[1] *Modern Hospital*, *64*, April 1945, p. 43 ff.

[2] Medical Care in a National Health Program, *Am. J. Public Health*, *34*, Dec. 1944, p. 1252.

[3] S. 191, 79th Congress, 1st Session.

[4] C.-E. A. Winslow: *The Life of Hermann M. Biggs.* Lea & Febiger, Phila., 1929. Chap. XVII, p. 345 ff.

men from war duty, there are still many localities in the State where a physician can be obtained, if at all, only after much delay and at a large and in some cases almost prohibitive cost. The Department has endeavored to relieve the situation by obtaining the names of physicians desiring a rural field and supplying these names to such communities and by advertising the names of the communities in several medical journals. While a small number of physicians have been located by these methods, the results have not been commensurate with the efforts put forth. Without greater financial inducement than the average rural community can offer, it is probable that most physicians will continue to prefer city practice. Evidently some method of giving adequate medical supervision and care must be devised to meet the situation . . .

During the year the Department has advocated and stimulated the formation of health coordination committees composed of delegates from various interested organizations and the establishment of health centers by local health municipalities. At first the main purpose was to bring all the health activities of a community under one roof in order to secure effective cooperation and cooordination between the various branches of public health work, thus increasing the efficiency, reducing the overhead expense of each, and making more money available for the actual conduct of the work. Such health centers as have been established have amply proved their worth. It is now believed that they should be broadened in scope to include general hospital facilities and the services of specialists in the various branches of medicine and surgery and also to offer to isolated localities and rural physicians facilities for more accurate diagnosis and more adequate care of the sick than are generally available. This plan will in no way supersede the local physician, but rather furnish him with facilities which he does not now have. State aid for the establishment and maintenance of these centers will be essential.[5]

At Dr. Biggs' request, the Public Health Council prepared a memorandum on health centers which has great practical as well as historical interest.[6] The complete text, which deserves careful study by every health worker, is appended.

Even a casual reading of the memorandum brings into sharp relief the fact that Biggs in no way subscribed to the opinion that medical care is outside the province of public health. On the contrary, the memorandum expressly states that "The District Health Officer may be the superintendent of the hospital and general director of health of the district and of the hospital and medical activities connected therewith."

Throughout the memorandum, the combination and integration of preventive and therapeutic services is stressed. Among the purposes of the health centers are not only the provision of "scientific, medical and surgical treatment, hospital and dispensary facilities, and nursing care," but also "facilities for an annual medical examination to detect physical

[5] New York State Department of Health, *Annual Report*, 1919, Vol. 1, p. 2.
[6] *Ibid.*, pp. 7-11.

defects and disease, and to indicate methods of correcting the same," as well as adequate public health nursing service and sufficient resources to deal promptly with epidemics. The health centers are to provide not only " laboratories, group diagnosticians, consultants and hospital facilities," but also " medical libraries including books, pamphlets, periodicals, leaflets, exhibits, moving picture films, and kindred educational facilities, with halls for meetings if needed." The health centers are to consist of hospitals; clinics for out-patients; clinical bacteriological and chemical laboratories; district health services; public health nursing service; center for school medical inspection; and headquarters for all health, medical, nursing and other public welfare activities of the district which wish to utilize the center. The hospitals " may include as units thereof existing or hereafter established hospitals or pavilions for the care of tuberculosis, for cases of other communicable disease, for children, for cases of maternity and mental diseases and for other groups." The outpatient clinics are to include " especially those now regarded as public health clinics, such as those for tuberculosis, venereal disease, prenatal and child welfare, mental and nervous diseases and defects and clinics for school children, dental clinics, and also medical, surgical and diagnostic clinics."

Several aspects of the Biggs memorandum deserve special mention in view of present day proposals. For example, the recently introduced Hill-Burton hospital construction bill, S. 191, has been sharply criticized because it requires that federal aid for the construction of hospital and health center facilities can be given only when there is a guarantee that the local communities will be able to maintain them. The Hill-Burton bill, which was designed to help rural communities in need of hospital facilities, is therefore involved in a serious contradiction which may vitiate the purpose of the bill, for it is the poorest rural areas, with the greatest need for hospital beds, that are unable to guarantee funds for maintenance. The Biggs memorandum attempts to solve this problem by the method of providing state aid for maintenance as well as construction of hospitals, clinics and laboratories, although it is weak in that it fails to provide a flexible state aid formula to assist the poorer counties. Of course, state aid for maintenance of facilities cannot provide a thoroughgoing solution of rural medical care problems. The basic problem of financing rural services can best be solved at the present time through the combination of health insurance and tax funds to support all types of service, including general practitioner as well as specialist and hospital care.

The memorandum proposes to solve the difficult problem of obtaining high quality medical and surgical services for rural areas by providing local medical practitioners with: "(a) Facilities for accurate diagnosis by a coordinated group of specially qualified physicians and surgeons, both for hospital patients and for out-patients; (b) Consultations and advice as to treatment by medical and surgical experts; (c) Clinical, bacteriological and chemical laboratory service and x-ray facilities at moderate cost or free when necessary."

The important recommendation is made that " the work of all health centers, hospitals, clinics, district laboratories, etc., connected therewith shall be inspected and standardized by the State Department of Health, and the State grants shall be paid only on the written approval of the Commissioner of Health."

The memorandum states that " Provision shall be made for occasional or periodic consultations or clinics at the health centers by specialists in medicine and surgery to be furnished through the State Department of Health, and wide previous public announcement of these clinics and consultations shall be made. At these consultations and clinics, health officers and physicians may bring their patients for assistance in diagnosis and for advice as to treatment. Fees received from these consultations for the State service shall be credited to the hospital or center where the service is rendered."

It is worth noting that the State Department of Health attempted in 1920 to provide consultation service for rural areas without waiting for legislative action on its health center proposals. Six group consultation clinics were held that year, and a total of 1,735 patients were examined. The service included a mobile diagnostic field laboratory and x-ray service, and a group of consultants representing pediatrics, orthopedic surgery, internal medicine, neurology and psychiatry, surgery and gynecology, dentistry, and the venereal diseases.[7] There were eighty-eight consultants and thirty-nine nurses sent by the Department to do this work. For the first four clinics, general publicity was used; the public was invited to attend the clinics to be examined, admission being obtained by cards signed by their private physicians. The attendance at these clinics was 462, 438, 314 and 319 patients examined. In the last two clinics, no publicity whatever was used except to physicians, and the physician was invited to refer only those cases upon which he desired to have consulta-

[7] New York State Department of Health, *Health News* (Public Health Nurses Bulletin), 1921, p. 1.

tion. The attendance at these clinics was 71 and 131 patients examined.[8] The project was apparently discontinued soon after, for there is no mention of additional clinics in the Annual Reports of the State Department of Health for 1921 and 1922.

In order fully to evaluate Biggs' health center proposals, it is necessary to view them in their specific historical context. During the first World War, health insurance became for the first time an important public issue in the United States. Between 1915 and 1920, eight states (California, Massachusetts, New Jersey, Connecticut, Illinois, Ohio, Wisconsin and Pennsylvania) appointed official commissions to investigate the subject.[9] Two national conferences were called by the investigating commissions, at Washington in 1917 and Cleveland in 1918.

The movement for health insurance was initiated by the American Association for Labor Legislation, which had conducted an energetic and successful campaign for workmen's compensation laws. In 1915 the Association drafted the so-called "Standard Bill" for health insurance, which was introduced into numerous state legislatures. In no state, however, did the health insurance movement reach the peak attained in New York.

In 1916 and 1917, the "Standard Bill" was introduced by Senator Ogden L. Mills in the New York State Legislature. During the latter year, a series of conferences was held by the American Association for Labor Legislation and the Health Committee of the New York State Federation of Labor, as a result of which the bill was considerably modified. In 1918, the revised bill was introduced by Senator Courtlandt Nicoll, but the campaign for the measure did not reach its climax until 1919, when it was introduced in the Legislature by Senator Davenport, a Republican, and Assemblyman Donohue, the Democratic leader in the Assembly.

The bill had impressive popular support. The New York State Federation of Labor made health insurance the chief plank in its legislative program. The Health Committee of the State Federation of Labor, with James M. Lynch of the State Industrial Commission as Chairman, and John M. O'Hanlon as secretary, campaigned vigorously for the bill. The measure had strong support from the Women's Joint Legislative Conference, a coalition of the Women's Trade Union League, the Young Women's Christian Association, the Consumers' League and the Woman's

[8] New York State Department of Health, *Annual Report*, 1920, Vol. 1, p. 10.

[9] Epstein, A.: *Insecurity, A Challenge to America.* Random House, New York, 1936, p. 448.

Suffrage Party. It was endorsed by the two City Clubs of New York, the Maternity Center Association, the Federation of Women's Clubs, the Women's Municipal League, and the Citizens' Union. In his message to the State Legislature on January 1, 1919, Governor Alfred E. Smith urged the enactment of a health insurance law. The State Charities Board and the State Reconstruction Commission gave official approval of health insurance.

Opponents of the measure included the New York State Manufacturers' and Merchants' Association, commercial insurance companies and the medical profession. Although in 1916 the Council of the Medical Society of the State of New York had endorsed the medical provisions of the tentative draft of the Compulsory Health Insurance Act,[10] by 1918 the medical profession of the state had become strongly opposed to health insurance. It may be noted in passing that forces external to the medical profession contributed in no small measure to the attitude of the physicians. For example, in the *New York State Journal of Medicine* of February 1917 there appeared an article which had been read before the New York County Medical Society on "The Economic Disadvantages of Compulsory Health Insurance," by William Gale Curtis, Chairman of the Educational Committee of the Insurance Economics Society of America (and also President of the National Casualty Company of Detroit).[11] According to a report issued by the New York State League of Women Voters in 1920, the "New York League for Americanism," organized by the lay opponents of health insurance, had "misled physicians and prevailed upon them to organize under the auspices of the 'League' into so-called 'Professional Guilds' by creating the impression that professional fees under the proposed workmen's co-operative illness insurance measure would be reduced as low as fifty, twenty-five, and even six cents, whereas it should be well known that the bill provides that professional fees shall be on a basis initiated by the various county medical societies." [12]

The Davenport health insurance bill was passed by the State Senate on April 10, 1919 by a vote of thirty to twenty. In the Assembly, however, Speaker Thaddeus C. Sweet, Chairman of the Rules Committee, refused to allow the health insurance bill and other welfare measures (eight hour day and minimum wage for women and minors) to come before the Assembly for a vote. Speaker Sweet denounced the bills as "Bolshe-

[10] *New York State Journal of Medicine*, 17, May 1917, p. 240.
[11] *Ibid.*, 17, Feb. 1917, p. 75.
[12] *American Labor Legislation Review*, 10, 1920, p. 99.

vistic," whereupon the *New York Times* made this editorial comment: "The people are, however, deeply interested in the welfare bills and the assumption of personal government by Speaker Sweet . . . Mr. Sweet's talk of 'Bolshevism' can have no other effect than to anger independent voters, who know very well that there is nothing Bolshevistic about these measures." [13]

Nevertheless, the opposition to the Davenport bill made increasingly heavy use of the label of "Bolshevism," and with increasing effectiveness. The "New York League for Americanism" waged its campaign against health insurance almost entirely on this basis.

When the State legislature met in 1920, the supporters of health insurance and the other welfare measures were prepared to rally powerful public support for their passage. Before the bills were introduced, however, Speaker Sweet suddenly precipitated the expulsion of five Socialist assemblymen. The atmosphere created by this action, the mounting hysteria over the menace of "Bolshevism" and the nationwide trend towards reaction expressed in the "back to normalcy" slogan, made the enactment of the health and welfare laws impossible. When Senator Davenport reintroduced his health insurance bill in the Senate on March 11, 1920, he indicated that he would not press for final passage of the measure, and added: "A vast organized propagandism, with great expenditures of money, has been set in motion against it in this state by designing men. For the time being, many intelligent persons are dupes of this propagandism. Until the hidden and selfish purposes which lie behind the organized and powerful propagandizing and lobbying of certain purely greedy business groups are disclosed, the proponents of this bill believe that an honest opinion upon the merits of the principle of illness prevention and health insurance inside the realm of industry, cannot be obtained." [14]

It was in this atmosphere, and with this background, that the Sage-Machold bill which embodied Hermann Biggs' health center proposals was introduced in the State Legislature on March 25, 1920. According to the *New York Times*, "The proposals embodied in the Sage-Machold bill have been indorsed by the State Department of Health and State Charities Aid Association and are put forward as compromise legislation in place of the Davenport Health Insurance bill." [15] A similar evaluation was made by Frederick MacKenzie, who, in reviewing the 1920 legislative

[13] *New York Times*, April 18, 1919, p. 12, col. 3.
[14] *American Labor Legislation Review*, 10, 1920, p. 145.
[15] *New York Times*, March 26, 1920, p. 12, col. 7.

campaign for health insurance in the *American Labor Legislation Review*, stated that the organized women voters "sensed the antagonism that even made it impossible for the State Department of Health and the Charities Aid Society to secure passage of a feeble compromise bill to provide health centers." [16]

There is a good deal of truth in this evaluation of the health center proposals. As Dr. Paul Lembcke, Director of Study of the New York State Commission on Medical Care has pointed out, the Sage-Machold bill was weak in that it was permissive rather than mandatory. The text of the bill reads: "The board of supervisors of any county may establish therein a health center or centers which shall serve the whole or part of the country." [17] This was undoubtedly the most serious weakness of the bill, for it would have allowed ample opportunity for the opponents of health centers to postpone and defeat practical acceptance of the proposals in many counties.

A second serious fault of the Sage-Machold bill was its retention of the means test. The bill reads: "The superintendent of such health center shall cause to be made such inquiry as he may deem necessary as to the ability of each patient or the relatives of such patient legally liable for his support, to pay for his care and treatment. If he shall find that such person, or said relatives, are able to pay for such care and treatment in whole or in part an order shall be made by the superintendent directing the patient or said relatives to pay to the treasurer of said health center for the actual cost of maintenance. He shall have the same power and authority to collect such sum from the patient or his relatives legally liable for such support as is possessed by an overseer of the poor. If the superintendent finds that such patient or said relatives are able to pay only in part, or not at all, for the care and treatment in said hospital, the unpaid cost of maintenance or treatment shall become a charge upon the county or district." [18]

The difficulties inherent in retention of the means test are well known to those who have had practical experience with medical care programs. There can be no doubt that it is a factor which operates to keep patients from seeking medical care early when serious complications can still be prevented. Furthermore, the means test system, with its onerous investigations and stigma of charity, is thoroughly disliked by large sections of

[16] *American Labor Legislation Review*, 10, 1920, p. 146.
[17] Appendix B to this article (Text of Sage-Machold bill), p. 406.
[18] *Ibid.*, p. 410.

the population who at one time or another have been subjected to it. That is one of the reasons for the wide popular demand for health insurance, since in a health insurance scheme the patient has paid in advance for his care and feels he is entitled to adequate medical attention rather than charity services.

In 1920, Hermann Biggs apparently rejected health insurance in favor of an extension of state medicine, for his proposed health centers, employing salaried physicians paid by county and state funds, represented not merely an attempt to provide hospital and health center facilities but to institute a state-county system of hospital and clinic care as an adjunct to the services of the private general practitioner and a counter-proposal to health insurance. In his President's Address to the Association of American Physicians in 1920, Biggs declared:

> There are several fairly well-established tendencies to be considered: One of these is the evidence of a widespread demand in many parts of the United States for the adoption of legislation looking to some form of so-called "health insurance," this legislation generally being modeled, more or less on the German or British plans. The demand for this comes in part from labor leaders and in part from those chiefly interested in general social betterment. Wherever such legislation is adopted it must powerfully influence the practice of medicine.
>
> There has also been for a long time a marked tendency in the more progressive communities for the public health authorities to include in their activities an ever-broadening field of work. This tendency seems inevitable and unavoidable whether or not it is desirable, as many physicians seem to doubt (a question which I shall not now discuss). It may be considered a practical form of governmental aid to the practice of medicine applied thus far almost wholly to the infectious diseases. The wide development of public health laboratories in recent years is a notable incident of this tendency.[19]

This statement can be said to make the issue one of state medicine versus health insurance only by implication, and Biggs himself apparently never expressed opposition to health insurance. However, one of his ablest lieutenants, Dr. August B. Wadsworth, Director of the Division of Laboratories and Research of the New York State Department of Health, vigorously criticized health insurance and proposed adoption of Biggs' health center proposals in an article in the *American Journal of Public Health* in 1920.[20] Also, in a contribution to *Health News*, published by the New York State Department of Health, Dr. Walter S. Goodale, Superintendent of the Department of Hospitals and Dispensaries of the City of Buffalo, described that city's hospital and health center

[19] *Transactions, Assn. of American Physicians, 35,* 1920, p. 2.
[20] *American Journal of Public Health, 10,* 1920, p. 53.

plan and stated: "All the provisions of the Health Center bill introduced at Albany during the last legislative session may be found in active operation in Erie County. . . . The plan is a complete answer to compulsory health insurance . . . Furthermore, the Erie County plan is a forerunner of FREE HEALTH, by which is meant that rich and poor alike will some day enjoy the highest possible degree of medical skill with the cost spread on the general tax rate." [21]

Actual experience has shown that the Buffalo plan has not proved to be "a complete answer to compulsory health insurance" or "a forerunner of free health." On the contrary, Buffalo's health centers have practically disappeared, while the hospital is now being transferred to the county because the city can no longer afford to operate it despite the fact that "free health" is limited to those who pass a means test. There is no doubt that the real situation is the reverse of that predicted in 1920; for compulsory health insurance would, by providing a larger and more stable income, be a very good answer to the problems of Buffalo's city hospital.

Biggs' error in counterposing health centers to health insurance in 1920 is understandable, since health insurance was a relatively new and untried concept. Today we can benefit by Biggs' experience and the accumulated experience of the intervening quarter of a century, which has proved quite definitely that the next great development in American medical care will come through health insurance rather than through the gradual extension or immediate establishment of state medicine. There is in the United States an overwhelming demand for health insurance, while no responsible group has urged establishment of state medicine as a practical program in the present economic and political setting.

The current public attitude towards state medicine is conditioned by the historical fact that in this country government medical services have consisted for the most part of charity hospitals and clinics, with their attendant evils of inadequate budgets, overcrowding, means tests, and lack of consideration of the individual. Health insurance puts an end to "charity"; it makes good medical care a right which the individual pays for in advance.

Those who claim that the provision of adequate hospital facilities will solve this country's health problems forget that facilities are of little use to communities which cannot afford to maintain them. On the other hand, the right to complete family practitioner, specialist and hospital care provided by a government health insurance system will have little practical meaning in areas lacking the necessary personnel and facilities. The

[21] New York State Department of Health, *Health News*, July 1920, p. 195.

reasoning which considers hospital facilities and health insurance as alternative solutions to the medical care problem is false and untenable. Clearly, hospital facilities and health insurance complement each other; both are essential. As Dr. Frederick Mott, Chief Medical Officer of the Farm Security Administration, has recently stated:

> Solving the problem of payment for medical services is basic to all the rest. If we fail to solve it, rural communities will neither get the physicians and dentists they need nor be able to maintain the hospitals which might otherwise be provided through current legislation. Unless we solve this problem we cannot build a broad program of high quality service emphasizing prevention, thorough diagnosis and complete care.
>
> Experience teaches us that use of the insurance mechanism levels the unpredictable costs of medical care when funds are pooled from a large group of people. Experience teaches us, too, that there are certain inherent weaknesses in applying the insurance principle to health on a voluntary basis. Planning in this field cannot all be done by local communities or by the states. There must be national planning, too.
>
> We have to face the fact that certain states are much poorer than others, usually the rural states. If rural people in these states are ever to get the benefits of medical science available to those in the wealthier industrialized states, it will only be by a national pooling of funds with contributions from all who can afford to pay, presumably through the use of both contributory insurance and taxation in sound combination.[22]

To continue to oppose health insurance in 1946 in the name of group practice or health centers is to ignore experience in this country. Ross-Loos, Permanente and other plans have demonstrated that health insurance provides a stable financial basis upon which group practices may be built. It is significant that the Health Insurance Plan of Greater New York, now in the process of establishment, is based entirely on group practice.

The assumption by health departments of the administrative responsibility for health insurance would end their isolation from the main body of American medicine and stimulate progress towards the type of health center envisaged by Biggs,—a center for all medicine, preventive as well as diagnostic and curative. Public health workers have a real duty to urge establishment of the kind of health insurance system which would permit such developments, and to encourage the maximum utilization of group practice, health centers, postgraduate education, regional coordination of medical school, hospital and health center facilities, and every possible means to improve the quality of medical care furnished under the health insurance system.

[22] *Modern Hospital*, *66*, April 1946, p. 89.

The Sage-Machold bill had impressive endorsement from national leaders in the public health field, including Theobald Smith, M. J. Rosenau, C.-E. A. Winslow, and Surgeon-General H. S. Cumming of the United States Public Health Service. Dr. Charles V. Chapin, Superintendent of Health in Providence, Rhode Island, wrote:

> The bill is well conceived and evidently worked out with great care. I am sure that it would mark a most important step in promoting the public health. Even in our large cities facilities for the care of the sick are insufficient and far from accomplishing what should be done. In small towns and in the country, conditions are far more unfavorable. I have long been of the opinion that the care of the sick should be closely correlated with the more strictly preventive work which is usually considered by the public as the sole function of the health department. Two exceptionally good features of the proposed bill are that it contemplates and provides for such correlation and secondly that it brings out the desirability of the association of out-patient clinic work with hospitals whenever possible. While isolated clinics for certain diseases and in certain places are doubtless necessary, I believe that it is far better when possible to connect such work as closely as possible with hospitals providing for bed treatment. If I were a health officer in the State of New York I would certainly be glad of the opportunity of supporting this measure.[23]

Dr. Winslow has described the hearing on the Sage-Machold bill held on April 14, 1920:

> The State Federation of Labor, the State Federation of Women's Clubs, the Grange, the State Dairymen's Association and a notable list of representatives of public health and welfare organizations appeared in support of the measure and it was endorsed by Dr. J. F. Rooney, Chairman of the Legislative Committee of the State Medical Society. Several county medical societies, on the other hand, joined the State Christian Science Society in opposition. It was actually the hostility of the medical profession which determined the issue; and as a result of its activity the Sage-Machold bill in which the Health Center program was embodied was defeated.[24]

While Dr. Rooney had endorsed the Sage-Machold bill in April 1920, it became clear as time went on that the medical profession of the state did not approve this endorsement. When the health center bill was revised and re-introduced in the State legislature as the Robinson-Moore bill in 1921, representatives of the medical profession opposed the measure at a public hearing held on March 30 because they "feared that it would prove harmful to the medical profession and that it meant the establishment of 'State Medicine.'" [25] The Robinson-Moore bill, like its predecessor, died in committee.

[23] State Charities Aid Association, *S. C. A. A. News*, *8*, May 1920, p. 6.
[24] C.-E. A. Winslow: *The Life of Hermann M. Biggs*, p. 352.
[25] State Charities Aid Assn., *S. C. A. A. News*, *9*, May–June 1921, p. 5.

At a symposium on health center legislation sponsored by the New York County Medical Society on December 29, 1920, Dr. Biggs was the only one of five speakers who took the affirmative. Dr. Edward Livingston Hunt, Secretary of the State Medical Society, summarized the objections of the medical profession to the Sage-Machold bill as follows:

1. Too much power is given to the laity and too litle to the medical profession.
2. Too much power is given to the County Boards of Supervisors and the Mayors of cities, which may make for political graft.
3. Too much power is given to the State Department of Health. It may be well enough to give such powers as this bill confers to the present State Department of Health, but how about a different and inefficient commission. Is it wise to give such powers to any department?
4. Too little recognition and power is given to the medical profession. Too much political control over the doctor is given to the elected official, the Supervisor and the Mayor.
5. It is a step towards centralization of government and paternalism. That is doubtless a tendency of the times, but is it not akin to government ownership of railroads?
6. It is a measure which, to a great extent, tends to or does deprive us of our liberties. It is an entering wedge toward state medicine. It may not be state medicine, but it is *county* medicine.
7. It is unfair insomuch that if Dr. Jones is connected with a health centre and Dr. Brown is not, Dr. Jones will receive certain advantages of prestige and financial emolument, which will not be open to Dr. Brown, as it will advertise the one and condemn the other to obscurity.
8. It puts a large number of medical men on a salary, and so does away with, or deprives them of, initiative and individualism, and must to a certain extent in that way lower the morale of the medical profession.
9. It cannot command the best talent in the medical profession. The State never can command the best that is in the State, because the State will never pay the rewards which the individual will. No State or government ever has secured the best except in the emergency of war.
10. And finally, it is an additional burden to the taxpayer.[26]

Dr. Biggs, in rebuttal, reviewed the evidence of serious shortages of physicians, nurses and hospital facilities in the rural areas of the State, and declared:

It was this situation which brought us to the consideration of this bill. The Health Centres Bill as it stands, I drafted; I take the full responsibility for it. It was then submitted to the Public Health Council, and modified in various respects, and as thus modified it was presented to the Legislature. . . .

But I do want to emphasize one or two things strongly. That is, that the medical profession has been very unfortunate, I think, in the general attitude which it has

[26] *New York State Journal of Medicine, 21*, Jan. 1921, p. 2.

taken. Perhaps you do not remember it, but I remember seven years ago speaking at a meeting in this hall, when you were discussing the supervision of venereal diseases, in which three or four papers were read attacking the action of the City Board of Health with reference to the supervision of the venereal diseases. I remember at that same time committees were appointed by the Medical Boards of the City Hospital, the Metropolitan Hospital and the Kings County Hospital, and these three committees forming a joint committee went to the Mayor and asked him to intervene and to compel the Health Board to rescind its action looking toward the supervision of venereal diseases. And all that the Health Board required then, or asked then, was that cases of venereal disease under treatment in general hospitals and in dispensaries should be reported to the Health Department, it providing laboratory facilities for the diagnosis of venereal diseases.

Nothing could have been sharper than the criticism at that time on the action of the Board of Health, or more general than the demand of the medical profession for the rescinding of that action. That was exactly what happened with regard to tuberculosis years ago, and I spent a good part of the winters of 1898 and 1899, and part of 1900 in Albany, trying to prevent the enactment of legislation which was initiated by the New York County Medical Society for withdrawing the power from the New York City Board of Health to deal with tuberculosis at all . . .

Now the general attitude of the medical profession is part of the kind of work that they do; the fact that a physician is generally so absorbed in what he is doing, his own work and the work with his own patients, that he does not look out and get a broad view of the situation as it exists in the state, and his attitude, the natural attitude, is one of obstruction. Now, I do not venture to maintain, nor would I for one moment argue, that the health centres legislation which was introduced last year is model legislation. It was the best that we were able to devise at that time. The need for it exists. Now, no action which this Society, the Academy of Medicine, or the profession of medicine in this state may take—no action of a negative kind is going to change that situation, and if we do not change it somebody else will take action to meet this condition . . .

Now if your Comitia Minora, or some special committee, will study the situation and offer constructive legislation or constructive criticism, that is what we want. But you may be quite sure that the attitude of simple opposition will not much longer be effective.[27]

According to Winslow, the application of bacteriology to the control of the contact-borne infections was, in this country, almost entirely the work of Biggs, and he played a significant role in the development of popular health education in the principles of personal hygiene. His ability to look forward, to organize the future, is dramatically expressed in the fact that at the age of sixty-one, two years before his death, Biggs was conducting a vigorous campaign in behalf of the next great objective of American public health,—the provision of adequate medical care of high quality to all the people.

[27] *Ibid.*, p. 6.

APPENDIX A

HERMANN BIGGS' MEMORANDUM ON HEALTH CENTERS

Memorandum as to the provisions of a bill authorizing a county, city or consolidated health district to create and maintain one or more health centres and providing State aid therefor.

Purposes

1. To provide for the residents of rural districts, for industrial workers and all others in need of such service, scientific, medical and surgical treatment, hospital and dispensary facilities, and nursing care, at a cost within their means or, if necessary, free.

2. To assist the local medical practitioners by providing:

   (a) Facilities for accurate diagnosis by a coordinated group of specially qualified physicians and surgeons both for hospital patients and for out-patients.

   (b) Consultations and advice as to treatment by medical and surgical experts.

   (c) Clinical, bacteriological and chemical laboratory service and x-ray facilities at moderate cost or free when necessary.

3. To encourage and provide facilities for an annual medical examination to detect physical defects and disease, and to discover conditions favorable to the development of disease, and to indicate methods of correcting the same.

4. To provide or aid in securing adequate school medical inspection and school nursing service.

5. To secure or aid in securing better enforcement of the Public Health Law and a more effective administration of public health activities within the area served.

6. To provide a public health nursing service adapted to and adequate for the community served.

7. To aid in securing the dissemination of information in regard to Public Health throughout the area served.

8. To aid in securing adequate compensation for medical and surgical care rendered in hospitals and clinics, in order that efficient service may be everywhere available.

9. To provide laboratories, group diagnosticians, consultants and hospital facilities in the smaller cities and rural districts, and to counteract the growing tendency of medical practitioners to remove to larger centres, and to attract to and to retain in the practice of medicine in these communities a larger number of qualified practitioners of both sexes.

10. To provide medical libraries including books, pamphlets, periodicals, leaflets, exhibits, moving picture films, and kindred educational facilities, with halls for meetings if needed.

11. To provide hospital and other necessary resources for dealing promptly with epidemics.

12. To reduce illness and disability among the industrial workers of the State by providing prompt and accurate diagnosis and efficient treatment for sick and injured workers and the members of their family.

13. To coordinate public health activities within the districts.

Health Centres

1. A health centre may consist of the following parts, any one or more of which parts may be established at one time with the approval of the Commissioner of Health and the formulation of a general plan for the whole centre.

(a) *Hospitals:* The erection of new hospitals or arrangements with other institutions or both, so that they shall form essential parts of the centre. Such hospitals may include as units thereof existing or hereafter established hospitals or pavilions for the care of tuberculosis, for cases of other communicable disease, for children, for cases of maternity and mental diseases and for other groups. Existing tuberculosis hospitals may become parts of the health centre of a city or county by which they may have been established.

(b) *Clinics for Out-Patients*, including especially those now required as public health clinics, such as those for tuberculosis, venereal disease, prenatal and child welfare, mental and nervous diseases and defects and clinics for school children, dental clinics, and also medical, surgical and diagnostic clinics.

(c) *Clinical, Bacteriological and Chemical Laboratories*, auxiliary to the State Laboratory, and x-ray laboratories with services at moderate charges, or free, affording modern laboratory facilities needed in the diagnosis and treatment of disease.

(d) *District Health Service* with a district health officer and deputy health officers in various parts of the district, such districts to be either a city or county, or a consolidation of two or more existing health districts (such consolidation to be approved by the Commissioner of Health). The present health officers in these districts shall act as deputies during their present terms of office. In the subsequent appointments of deputies in the various portions of the districts, persons residing therein possessing the qualifications prescribed by the Public Health Council shall have preference. Each local health board shall appoint for its town or village a deputy to the health officer of the health centre district.

(e) *Public Health Nursing Service*, including school nursing for all parts of the district.

(f) *Centre for School Medical Inspection* with proper medical supervision and facilities to enable practitioners to provide adequate treatment for all school children showing physical defects or disease.

(g) *Headquarters for all Health, Medical, Nursing and other Public Welfare Activities* of the district which wish to utilize the centre.

2. The locations, sites, plans and initial equipment of the health centre shall be subject to the approval of the State Department of Health. The State Department

of Health and the State Architect shall provide model plans for such centres for any community requesting them.

STATE AID TO HEALTH CENTRES

1. To be granted for each hospital bed constructed or provided for under this statute.

(a) For new construction and equipment of hospitals, one-half of the cost to be paid by the State, such payment not to exceed $750 per bed, and beds for the purpose of this provision to be in proportion not in excess of one to each 500 of the population.

(b) A grant of 60 cents per day for every free patient maintained in any hospital operated as part of a health centre.

2. To be granted for clinics and annual medical examinations.

(a) A grant for the creation of out-patient clinics equal to one-half of the initial cost of establishment, the amount to be paid by the State for this purpose not to exceed $5,000 per clinic, and 20 cents for each free treatment in such clinic; one such centre for each district, provided that in counties or cities or districts having more than 50,000 population there shall be not more than one health centre per 50,000 inhabitants or major fraction thereof.

(b) A grant of 50 cents for each free comprehensive annual medical examination made at the health centre.

3. *For the Maintenance of Laboratories:* A grant from the State of one-half of the annual cost of maintenance of laboratory of health centre, the sum to be paid by the State not to exceed $3,000 per annum for each laboratory, and $1,500 toward the initial installation and equipment of such laboratory.

4. *For Salaries of Deputy Health Officers:* A grant of 10 cents per capita per annum toward the salaries of deputy health officers in health districts having less than 1,500 population, and of 5 cents per capita per annum in health districts having a population between 1,500 and 3,000 in addition to such salaries as they are entitled to receive from the local treasury.

5. The total annual grants for the construction of hospitals and clinics shall not be in excess of $2,000,000, and for the maintenance and operation not in excess of $2,000,000. Salaries and traveling expenses of consultants and experts employed by the State Department of Health, and other expenses necessarily incurred by the State Department of Health in the enforcement of this law, shall be paid from the sum appropriated for grants toward maintenance and operation of health centres—this sum not to exceed $250,000 per annum.

The District Health Officer may be the superintendent of the hospital and general director of health of the district and of the hospital and medical activities connected therewith. The qualifications for district health officers, deputy health officers, superintendents of hospitals and medical activities, chiefs of clinics and other medical officials and nurses shall be fixed by the Public Health Council, and their appointments be subject to the regulations of the State Civil Service Commission.

The work of all health centres, hospitals, clinics, district laboratories, etc., con-

nected therewith shall be inspected and standardized by the State Department of Health, and the state grants shall be paid only on the written approval of the Commissioner of Health.

Provision shall be made for occasional or periodic consultations or clinics at the health centres by specialists in medicine and surgery to be furnished through the State Department of Health, and wide previous public announcement of these clinics and consultations shall be made. At these consultations and clinics, health officers and physicians may bring their patients for assistance in diagnosis and for advice as to treatment. Fees received from these consultations for the State service shall be credited to the hospital or centre where the service is rendered.

The health centre laboratories shall be under the supervision of the Director of the State Health Department Laboratories, in order that their work may be maintained at a high level of efficiency; and the facilities of the State Laboratory service shall be available to supplement those of the laboratories of the health centres.

The salaries of the medical and surgical staff, the fees for medical and surgical care, and the conditions for free service in the hospitals and clinics shall be determined by the Boards of Managers. The method of appointment and the composition of such Boards of Managers of the health centres and hospitals to be provided for in this bill.

APPENDIX B

TEXT OF THE SAGE–MACHOLD HEALTH CENTER BILL

An act to amend the public health law, so as to provide for residents of rural districts, for industrial workers and for all others who cannot otherwise secure such benefits, adequate and scientific medical and surgical treatment, hospital and dispensary facilities and nursing care, to assist local medical practitioners, and in general to improve the health of the inhabitants of the state by authorizing a county, city or health district to create and maintain one or more health centers, to provide state aid for same, and making an appropriation therefor.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Article three of chapter forty-nine of the laws of nineteen hundred and nine, entitled "An act in relation to public health, constituting chapter forty-five of the consolidated laws," is hereby amended by inserting therein four new sections to be known as sections twenty-b, twenty-c, twenty-d, and twenty-e and to read as follows:

20-b. Health districts. The board of supervisors of any county, with the approval of the state commissioner of health, shall have the power to establish such county, or any part or parts thereof, as a health district and in such event shall appoint a board of health for each of such districts. The board of health shall consist of five members, at least one of whom shall be a graduate of at least three years' standing of a medical college. The term of office of each member of said board shall be five years and the term of one of the members shall expire annually. The first appointments shall be made for the respective terms of five, four, three, two and one years.

The members of the board shall receive no compensation for their services but shall be allowed their actual and necessary traveling expenses, to be audited and paid in the same manner as the other expenses of the county. When such board of health has been established it shall within its district exercise all the powers and perform all the duties of local boards of health conferred by any law or laws or by the state sanitary code.

Such board of health shall appoint a district health officer who shall possess such qualifications as may be prescribed by the public health council. Such district health officer shall serve for a term of six years and shall devote his whole time to the duties of his office except as hereinafter authorized. He shall within his district possess all the powers and duties conferred upon local health officers by any law or laws, or by the state sanitary code. The salary of such district health officer shall be fixed by the board of health of such district.

Local health districts now existing within such health district so established by the board of supervisors shall continue to exist as subdivisions of the health district. Local boards of health within such district shall continue to exist and to retain their present power and duties subject to the ruling and ordinances of the district health board and shall continue to appoint health officers for such local districts, as now provided by law. The board of supervisors shall have power within any health district established as hereinbefore provided to consolidate with adjoining districts all local health districts having a population of less than one thousand. When such consolidation has been ordered by the board of supervisors the same steps shall be taken and the same rights and duties devolve upon all persons as ensue upon the signing of the order for consolidation by the state commissioner of health, as provided for in sections twenty and twenty-a of this act. Provided, however, that no consolidation so ordered shall take effect until the expiration of the terms of the local health officers affected who are in office on the first day of July, nineteen hundred and twenty, unless with the consent of such local health officers. The local health officers within the health districts when established shall act as deputies to the district health officer. They shall, subject to the supervision of the district health officer, perform within their local districts all of the duties of local health officers and shall serve for the same terms and under the same conditions as now are, or hereafter may be, prescribed by law. Present local health officers in office at the time of the passage of this act shall act as such deputies during their present term of office and shall be eligible for reappointment if they have complied with the qualifications of the public health council, and hereafter no one shall be appointed as local health officer unless he has complied with the qualifications prescribed by the public health council or has been duly exempted from said qualifications by the said council.

20-c. Health centers. The board of supervisors of any county may establish therein a health center or centers which shall serve the whole or part of the county. In the resolution of the board of supervisors establishing such health center they shall define the area which it is intended to serve. Such board when it has decided to establish a health center shall formulate a general plan for the same which may include any one or more of the parts hereinafter set forth, and which shall be subject to the approval of the state commissioner of health. Any one or more of the

following parts of such health center may be established at one time with the approval of the state commissioner of health:

a. For the erection of hospitals or for arrangements with existing hospitals or other institutions, or both, so that they shall form essential parts of the health center. Such hospital provision may include as units thereof hospitals or other kindred institutions now existing, or hereafter established, and special pavilions for the care of tuberculosis and other communicable diseases, and for children, maternity cases, for mental diseases and other groups of diseases.

b. Clinics for outpatients, including especially those now regarded as public health clinics, such as maternity, prenatal and child welfare clinics, those for tuberculosis and venereal disease, mental and nervous diseases and defects, clinics for school children, dental clinics, and also general medical, surgical and diagnostic clinics.

c. For clinical, bacteriological, X-ray and chemical laboratories auxiliary to the state laboratories affording modern laboratory facilities needed in the diagnosis and treatment of disease, with services at a moderate charge or free if the person served is found by the superintendent of the health center to be unable to pay in accordance with the procedure hereinafter set forth in paragraph number six of the duties of the superintendent.

d. For public health nursing service for all parts of the district.

e. For co-operation with the department of education in securing proper medical supervision and medical inspection for school children and assisting in providing the facilities to enable practitioners to secure adequate treatment for all school children showing physical defects or disease.

f. For periodical medical examination of such inhabitants of the district as desire it and are willing to pay a proper charge therefor.

g. For headquarters for all other public health, medical, nursing and other public welfare agencies of the district which wish to utilize the same.

The location, site, plans and initial fixed equipment of the health center and of any part or parts thereof shall be subject to the approval of the state commissioner of health. The state commissioner of health and the state architect shall provide model plans for such centers for any community requesting the same. The board of supervisors when they shall have determined to establish such health district shall have the following powers:

1. To purchase or lease real property therefor or acquire such real property and easements therein. Provided, however, that no such property shall be purchased or acquired until such purchase or acquisition shall have been approved by the state commissioner of health.

2. To enter into contracts for the erection of all necessary buildings and the alteration of any buildings on the property when acquired for the use of such health center or any part or parts thereof. Provided that the location of the buildings and the plans and specifications for such erection and alteration, together with the initial fixed equipment, shall first have been approved by the state commissioner of health. Any changes in such locations or plans made subsequent to the approval

of the state commissioner of health shall also be approved by him, and the state commissioner of health and his duly authorized representatives shall have the power to inspect all parts of such health centers during the course of their construction or alteration for the purpose of seeing that such plans or specifications are complied with.

3. To cause to be assessed, levied and collected such sums of money as it shall deem necessary for suitable lands, buildings and improvements for such health center, or part or parts thereof, and for the maintenance thereof, and for all other necessary expenditures. Provided, however, that where the health center is intended to serve less than a whole county the expenditures made in connection therewith shall be assessed only against the district served by the health center. Said board of supervisors shall also have power to borrow money for the erection of such health center, or parts thereof, and for the purchase of a site therefor on the credit of the county and issue county obligations therefor in the same manner as it may do for other county purposes.

4. To accept and hold in trust for the county any grant or devise of land or any gift or bequest of money or other personal property or any donation to be applied, principal or income, or both, for the benefit of the said health center or any part or parts thereof, and apply the same in accordance with the terms of the gift.

5. To appoint a board of managers of the health center which shall consist of seven members one of whom shall be the county judge ex officio. Of the others two shall be physicians duly licensed to practice in the state of New York and at least one shall be a woman. The board shall hold a meeting at least once each month and for each regular meeting each member attending shall receive the sum of five dollars and his or her actual and necessary travelling expenses, to be audited and paid in the same manner as the other expenses of the health center. Special meetings may be called from time to time in such manner as the by-laws may provide. For attendance at such special meetings no fees shall be paid to members. The members of such board, with the exception of the county judge, shall be first appointed so that the term of one member shall expire within one year from the first day of January of the year in which he shall have been appointed, the term of another member shall expire within two years from the first day of January of the year in which he shall have been appointed, the term of another member shall expire within three years from the first day of January of the year in which he shall have been appointed, the term of another member shall expire within four years from the first day of January of the year in which he shall have been appointed. The term of another member shall expire within five years from the first day of January of the year in which he shall have been appointed, and the term of the remaining member shall expire within six years from the first day of January of the year in which the appointment is made.

The board of managers of each health center shall have the following powers and duties:

1. To appoint a superintendent of the health center, or any part thereof, who may also be secretary and treasurer of the board of managers. The district health officer may be appointed as such superintendent. Any person appointed as such

superintendent shall comply with the qualifications prescribed by the public health council.

2. To fix the salaries of the superintendent of the health center and of all other officers and employees, within the limits of the appropriations made therefor by the board of supervisors.

3. To exercise general management and control of said health center, of the grounds, buildings, officers, attending physicians, employees and inmates thereof, and of all matters relating to the government, discipline, contracts and physical concerns thereof.

4. To make such rules and regulations as may be advised by the medical board as necessary for the medical and surgical care and treatment of patients and for the study of the nature and cause of death in cases terminating fatally. They shall make rules and regulations regulating the fees to be charged for all medical and surgical services in such hospital, and fixing the salaries of attending physicians and all other rules and regulations necessary for the carrying into effect of the purposes of such health center. It is the purpose of this act to provide, through the co-ordinated work of experts in the different departments of medical practice, adequate facilities for accurate diagnosis and efficient treatment of disease. Boards of managers are directed to carry this purpose into effect so far as practicable. Physicians and surgeons rendering services in hospitals and clinics shall be properly compensated for their services and boards of managers shall see that such compensation is provided.

5. Notwithstanding any other general or special law, to erect all additional buildings found necessary after the health center has been placed in operation and make all necessary improvements and repairs within the limits of the appropriations made therefor. Provided that the location of the buildings and the plans and specifications for such additional buildings, improvements and repairs shall first be approved by the state commissioner of health.

6. To employ, within the limits of its appropriations, public health nurses for the discovery of cases of communicable or other diseases, for the visitation of such cases and of patients discharged from the health center hospital or from any other part of such health center, and for the performance of such other duties as may seem proper.

7. To appoint a medical board which shall have charge of the medical and surgical affairs of the health center.

8. To appoint and employ, after consultation with the medical board, all members of the medical, surgical and laboratory staff of the health center. All persons appointed to such positions shall comply with such requirements as may be prescribed by the public health council.

The superintendent of such health center shall be the executive officer of all hospitals, clinics, laboratories and other activities of the health center and, subject to the board of managers and the approval of the state commissioner of health, shall:

1. Equip the health center hospital and all other parts of such health center with all necessary furniture, appliances, fixtures and other needed facilities for the

care and treatment of patients and for the use of officers and employees thereof, and purchase all necessary supplies within the appropriations made therefor.

2. Have general supervision and control of the internal affairs of the health center and maintain discipline therein and enforce compliance with and obedience to all rules, by-laws and regulations adopted by the board of managers for the government and control of such health center and the employees and inmates thereof. He shall make and enforce such further rules, regulations and orders as he may deem necessary, not inconsistent with law or with the rules and regulations of the board of managers.

3. Appoint such other employees as he may think necessary and proper within the limits of his appropriations, except the attending physicians.

4. Cause proper accounts and records of the business and operation of the health center to be kept; certify all bills and accounts including salaries and wages, and transmit them to the board of supervisors which shall provide for their payment in the same manner as other charges against the county.

5. Receive, subject to the rules and regulations of the board of managers of the health center, into such health center, or to any part thereof, in order of application, or treat in such clinics, dispensaries, et cetera, any person in the health district who is in need of medical or surgical care, irrespective of whether such person is able to pay for such care or not.

6. Cause to be made such inquiry as he may deem necessary as to the ability of each patient, or the relatives of such patient legally liable for his support, to pay for his care and treatment. If he shall find that such person, or said relatives, are able to pay for such care and treatment in whole or in part an order shall be made by the superintendent directing the patient or said relatives to pay to the treasurer of said health center for the actual cost of maintenance. He shall have the same power and authority to collect such sum from the patient or his relatives legally liable for such support as is possessed by an overseer of the poor. If the superintendent finds that such patient or said relatives are able to pay only in part, or not at all, for the care and treatment in said hospital, the unpaid cost of maintenance or treatment shall become a charge upon the county or district. Provided, that in case such patient has not acquired a settlement within such health district under the provisions of the poor law, the superintendent of such health center shall collect from the town, city, village or health district in which such person has a settlement the cost of his maintenance, or may in his discretion return such patient to the town, city, village, county or health district in which he has a settlement. No employee of such health center, except physicians, shall receive or accept from any patient thereof any fee, payment or gratuity whatsoever. Any physician who has been attending any patient prior to such patient's admission to the hospital of the health center shall be allowed, if the patient so desires, to continue such treatment while the patient remains in the hospital.

7. Cause to be kept proper records of the admission and treatment of each patient, including name, age, sex, color, marital relation, residence, occupation, place of last employment and the names and addresses of his or her nearest relatives. He shall also cause a careful examination to be made and recorded of the physical

condition of all persons admitted to or treated at the hospital and shall cause a record to be kept of the condition of such patient during treatment and when discharged and from time to time thereafter.

8. Discharge from such hospital or cease to provide treatment for any patient who is found to have recovered sufficiently from his illness no longer to be in need of hospital care, or other treatment, or who shall violate wilfully or habitually the rules or who for any reason is no longer a suitable person for treatment.

9. Collect and receive all moneys due the health center, keep an accurate account of the same and report the same to the monthly meeting of the board of managers and transmit the same within ten days after such meeting to the treasurer of the county.

10. Give a bond before entering upon the discharge of his duties, in such sum and with such securities as the board of managers may approve, to secure the faithful performance of his duties.

20-d. Health centers in cities. The common council or anybody exercising similar duties in any city, and the board of estimate and apportionment in the city of New York, shall have the power, with the approval of the state commissioner of health, to establish a health center or centers in such city and to define the limits thereof. Upon the establishment of such health center by such city all the powers and duties herein provided for in relation to health centers shall devolve upon the corresponding officials of the city, excepting that the mayor shall appoint the members of the board of managers of such health center and that the board of health of such city, if there be such board of health, and the health officer thereof shall be appointed as now or hereafter provided for by law. All of the provisions of section twenty-c hereof shall apply in so far as practicable to health centers when established in cities.

20-e. State aid. Where such health district or health center shall have been established with the approval of the state commissioner of health, the state, through the legislature, shall provide the following aid:

a. For the construction and equipment of hospitals one-half of the cost thereof, such payment not to exceed seven hundred and fifty dollars per bed established in such hospital, and for this purpose no aid shall be granted from the state for beds in excess of one to each five hundred of the population affected.

b. A grant of seventy-five cents per day for each free patient maintained in any hospital operated as a part of such health center.

c. A grant for the establishment of each outpatient clinic of the health center equal to one-half of the cost of installation, the amount to be paid by the state for this purpose not to exceed five thousand dollars per clinic.

d. A grant towards the ordinary current expenditures for free treatments, in such clinic not to exceed fifty per centum of such cost and not to exceed an average of twenty cents per treatment.

e. A grant of one-half of the actual cost of maintenance of the laboratory and laboratories of health centers not in excess of three thousand dollars per annum for each laboratory and of fifteen hundred dollars towards the initial installation and equipment of such laboratory.

f. A grant of ten cents per capita per annum towards the salaries of deputy health officers in such health districts where the local district has less than fifteen hundred population, and of five cents per capita per annum towards the salaries of deputy health officers in local districts having a population between fifteen hundred and three thousand, in addition to such salaries as they are entitled to receive from the local treasurer.

Provided, however, that no state aid in excess of the above specified amounts shall be granted hereunder in counties or districts having more than fifty thousand population if more than one health center is established for each fifty thousand inhabitants, or major fraction thereof.

It is the intention of this act to provide additional hospital and clinical facilities and, therefore, no grant from the state hereinbefore provided for shall be given to any public institution which is already established at the time of the passage of this act, excepting clinics especially established for prenatal, maternity and postnatal care, and those for children, tuberculosis and venereal diseases.

The salaries and traveling expenses of consultants, experts and other employees of the state department of health, and other expenses necessarily incurred by the state department of health in the execution and enforcement of this act shall be paid from the sum appropriated for grants towards maintenance and operation of health centers as hereinbefore specified, such sum for this purpose not to exceed two hundred and fifty thousand dollars in any one year.

The work of all health centers, including hospitals, clinics, laboratories, et cetera, connected therewith, shall be inspected and standardized by the state department of health, and all the state grants herein provided for shall be paid only on the written approval of the state commissioner of health after inspection of such center and the work done therein.

Provision shall be made by the state commissioner of health for occasional or periodical consultations and clinics at the health centers by specialists in medicine and surgery. To these consultations and clinics health officers and physicians may bring their patients for assistance in diagnosis and for advice as to treatment. Persons able to pay in whole or in part for consultative services shall be charged a reasonable sum therefore and the sum so received shall be paid into the treasury of the health center. It is not intended that this arrangement shall in any way affect the private relation which may exist between the patient and his own physician who brings him to the health center.

Health center laboratories shall be under the supervision of the director of the state health department laboratories and the facilities of the state laboratory service shall be available at all times to supplement those of the laboratories of the health centers.

2. There is hereby appropriated out of any moneys in the treasury of the state not otherwise appropriated, to be available on the first day of July, nineteen hundred and twenty, the sum of one hundred thousand dollars ($100,000) for carrying out the purpose of this act and for the expenses incurred by the state department of health in putting this act in operation, to be payable by the state treasurer on the warrant of the comptroller on the certificate of the state commissioner of health.

This act shall take effect immediately.

GEORGE ELIOT: MEDICAL DIGRESSIONS IN *MIDDLEMARCH*, AND ELIOT'S STATE OF HEALTH

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In recent years, George Eliot's novel *Middlemarch* has begun to emerge from the body of the collected works, as the finest in every sense of that writer's literary endeavors. The process of recognition has been gradual but continuous, for there has been keen competition in earlier novels . . . in particular, *Adam Bede*, *Silas Marner*, and *The Mill on the Floss*. None of Eliot's novels are the product of youth or immaturity, since she did not seriously consider the medium of prose fiction until she was well along in her thirties. A natural desire to disguise her identity, in the event her first attempt at fiction was ill received, impelled her to discontinue the use of her real name, Marian Evans, when she published *Amos Barton* in *Blackwood's Magazine* (1858), for as Marian Evans she had built up quite a reputation as assistant editor of the *Westminster Review* and as free-lance reviewer, essayist, and translator.

Middlemarch, aside from the question of its literary superiority, has for some time merited the attention of medical men.

> The best imaginative portrait of the high-bred physician of the intellectual type is that of Lydgate, in George Eliot's "Middlemarch," a novel which, on the whole, affords the most effective side-light on English medicine in the late Georgian and early Victorian periods.[1]

The chief interest in *Middlemarch* from the physician's standpoint has hitherto centered in the snobbish contentions of county dowagers who looked upon their medical attendants as high-class servants. The appearance of Lydgate upon the local scene brought up a small problem in social etiquette and a large one in ethics. He was a pioneer eclectic in the county and gave constant offense by his denunciation of the "shotgun" system of prescribing medicines, and by the vigor of his assertions that coroners should be physicians trained in jurisprudence rather than lawyers untrained in medicine. Lydgate did well both for himself and his patients, in the beginning, but contracted a poor marriage with a beautiful but selfish girl who involved him in money difficulties. Lydgate was quite innocently involved in a poison homicide but under suggestive circum-

* From the University of Richmond.

[1] Fielding H. Garrison, *An Introduction to the History of Medicine*, Philadelphia, Saunders, 1914, p. 637.

stances that did his good name no favor. He is depicted as having died in London, where he had removed, in his fiftieth year, or 1852. Attempts of literal-minded critics to identify Lydgate with Eliot's lover, George Henry Lewes, have not been visited with complete success. Lydgate was handsome, Lewes notoriously homely. Lewes was not a graduate in medicine, although it is true that he had studied medicine in his youth and was throughout his lifetime both a scientist and philosopher. Both Lydgate and Lewes had married badly, but while Lydgate stuck to his wife, Lewes separated from his Agnes and lived with George Eliot. Lewes and Lydgate each had three children, but Lydgate's were all legitimate; two of Lewes', if legally legitimate, were morally bastards. They bore the name of Lewes but they looked like Thornton Hunt, Esq. Lewes' Agnes was an actress; Lydgate's Rosamund was the daughter of a banker and pillar of the middle class. There are a variety of other irreconcilable discrepancies between the fictional life of Lydgate and the real life of George Henry Lewes, but the most convincing negation of the identification is that George Eliot represents the death of Lydgate in the year 1852, and this premature decease of Lydgate was described about the year 1872, six years before Lewes was to die. While George Eliot was not of a superstitious nature, who would not hesitate to provoke the fates? It seems more likely that George Eliot drew her characters from her own imagination. The facility with which great novelists and dramatists create their *dramatis personae* is one of the symptoms of their genius. Critical writers, biographers, and run-of-the-mine literati not only lack this attribute, but lack the perspicuity to recognize it as a hallmark of genius.

In *Middlemarch*, George Eliot resorted to the common Victorian device of turning back the hands of Time to the years of her childhood. This retroverting of Time, much practiced by many of Eliot's contemporaries both in England and on the continent, is probably a hold-over from less enlightened epochs when the royal censors or academicians were prone to pore over contemporary literature, seeking for seditious sentiments or scurrilous allusions to the Prince and/or his retinue. And even in the 1870's, novelists could write with much greater freedom of the past than of the present.[2] There has been a great deal of posh written about George Eliot's fleeing back to the sanctuary of childhood to escape the harsh realities of life, etc. etc., re-enforced by pseudo-Freudian observa-

[2] Now that this venerable device has fallen into disuse, it is necessary for novelists to preface their books with statements to the effect that both characters and events alluded to are wholly imaginary.

tions to lend an appearance of verisimilitude. All this super-scientific huffing and puffing leads to nowhere; the only preoccupation with the past in George Eliot turns about the simple nostalgia for the good old days that everyone experiences.

Perhaps that was a more cheerful time for observers and theorizers than the present; we are apt to think it the finest era of the world when America was beginning to be discovered, when a bold sailor, even if he were wrecked, might alight on a new kingdom; and about 1829[3] the dark territories of Pathology were a fine America for a spirited young adventurer. Lydgate was ambitious above all to contribute towards enlarging the scientific, rational basis of his profession. The more he became interested in special questions of disease, such as the nature of fever or fevers, the more keenly he felt the need for that fundamental knowledge of structure which just at the beginning of the century had been illuminated by the brief and glorious career of Bichat,[4] who died when he was only one-and[-]thirty, but, like another Alexander, left a realm large enough for many heirs. That great Frenchman first carried out the conception that living bodies, fundamentally considered, are not associations of organs which can be understood by studying them first apart, and then as it were federally; but must be regarded as consisting of certain primary webs or tissues, out of which the various organs — brain, heart, lungs, and so on — are compacted, as the various accommodations of a house are built up in various proportions of wood, iron, stone, brick, zinc, and the rest, each material having its peculiar composition and proportions. No man, one sees, can understand and estimate the entire structure or its parts — what are its frailties and what its repairs, without knowing the nature of the materials. And the conception wrought out by Bichat, with his detailed study of the different tissues, acted necessarily on medical questions as the turning of gas-light would act on a dim, oil-lit street, showing new connections and hitherto hidden facts of structure which must be taken into account in considering the symptoms of maladies and the action of medicaments. But results which depend on human conscience and intelligence work slowly, and now at the end of 1829, most medical practice was still strutting or shambling along the old paths, and there was still scientific work to be done which might have seemed to be a direct sequence of Bichat's. This great seer did not go beyond the consideration of the tissues as ultimate facts in the living organism, marking the limits of anatomical analysis; but it was open to another mind to say, have not these structures some common basis from which they have all started, as your sarsenet, gauze, net, satin and velvet from the raw cocoon? Here would be another light as of oxyhydrogen, showing the very grain of things,

[3] There is no particular significance in the year 1829. George Eliot is not a stickler for dates. It does no harm for a novelist who has withdrawn into the past to date his work in some unobtrusive manner, and this is the device George Eliot has elected.

[4] Marie François Xavier Bichat, 1771–1802. He held an appointment at the Hôtel Dieu under Pinel, and did a great deal of the autopsy work there. Authorities differ as to the way he came to his untimely end. Some say he contracted an infectious disease, others, that he fell down a flight of stairs.

and revising all former explanations. Of this sequence to Bichat's work, already vibrating along many currents of the European mind, Lydgate was enamoured.[5]

This interesting evaluation of Xavier Bichat is realistic and as far as it goes, accurate. Even more than the court-room scenes of *Felix Holt*, it demonstrates the lengths to which a conscientious novelist will go to assure the correctness of realistic detail. But it does not go quite far enough for there is, indeed, a gap, an illogical hiatus, situate right in the middle of the reasoning.

For George Eliot, in this exposition of the Bichat tissue theory, has explained how living bodies can not be understood, without explaining how they *can* be understood. She has been at pains to emphasize that, according to Bichat, the organs are composed of the several different tissues, and she has used the familiar analogy of a house to bring the matter down to earth to the lay mind. She reverts to pathology, without mentioning the term itself, with " symptoms of maladies and the action of medicaments," but she has neglected to mention what organs are, with reference to tissue, nor has she attempted to show the great significance of tissue with reference to pathology. And this is what she started out to do. In the process of simplification, has she not perhaps given an erroneous impression of the tissue with respect to its importance in the understanding of the organism in its entirety? There are many who I am sure will disagree with the dictum that bodies are not to be understood first by studying the organs separately and then with reference to the organism as a whole. Surely Bichat would have been among the first to deny any such idea, and if this method of considering the organism found its first formal expression in Paracelsus, in practice it goes back to antiquity. I believe that George Eliot has the words right but doesn't know the music. I feel it should be clear even to a layman with any first-hand acquaintanceship with the *General Anatomy* of X. Bichat, that in modern pathology a diseased organ is a diseased organ only in that one or more of its several tissues is affected. And *this* is the flood of light upon a dim-lit thoroughfare: that a disease of the liver implies nothing inherent in the liver itself, but a certain growth or a certain degeneration of this or that tissue which composes the organ. To re-utilise the time-worn analogy of the house, in keeping with George Eliot's metaphor, a house which has been invaded by termites suffers a general weakening in its joists and

[5] *Middlemarch*, Book II, Ch. 16. There are so many different editions of *Middlemarch*, both in one and in two volumes, that it seems desirable to identify citations by book and chapter numbers rather than by pagination.

beams. The weakening of the joists and beams proceeds from the tunnels and runways and galleries which the ants have bored through the wood of the beams. The universal idea conjured up in the term "beam" is not affected by the weakening of the particular beams in question, but only the wood of the beams, and as the wood is to the beam or joist, so is the osseous tissue of the bone to the bone itself.

In order that Bichat's tissue theory as propounded by Eliot may be checked to the source, I quote two paragraphs from the *General Anatomy Applied to Physiology and Medicine*:

> All animals are an assemblage of different organs, which, executing each a function, concur in their own manner, to the preservation of the whole. It is several separate machines in a general one, that constitutes the individual. Now these separate machines are themselves formed by many textures of a very different nature, and which really compose the elements of these organs. Chemistry has its simple bodies, which form, by the combinations of light, hydrogen, oxygen, carbon, azote, phosphorus, &c. In the same way anatomy has its simple textures which, by their combinations four with four, six with six, eight with eight, &c. make the organs. These textures are, 1st. the cellular; 2d. the nervous of animal life; 3d. the nervous of organic life; 4th. the arterial; 5th. the venous; 6th. the texture of the exhalants; 7th. that of the absorbents and their glands; 8th. the osseous; 9th. the medullary; 10th. the cartilaginous; 11th. the fibrous; 12th. the fibro-cartilaginous; 13th. the muscular of animal life; 14th. the muscular of organic life; 15th. the mucous; 16th. the serous; 17th. the synovial; 18th. the glandular; 19th. the dermoid; 20th. the epidermoid; 21st. the pilous.
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> These are the true organized elements of our bodies. Their nature is constantly the same, wherever they are met with. As in chemistry, the simple bodies do not alter, notwithstanding the different compound ones they form.[6]

Bichat's "ultimate facts" were therefore derived from observation at the dissecting table and in the autopsy room. He was a clinician, not a technician; an empiricist, a medical pragmatist. He was not concerned with the "grain of things" but with the facts as he observed them. Neither Bichat nor Lydgate, his fictional prototype, relied upon the microscope. This they left to the Schwanns, the Schleidens, to Purkinje and to Shultze.

There was another attraction in his profession: it wanted reform, and gave a man an opportunity for some indignant resolve to reject its venal decorations and

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[6] Bichat, *op. cit.*, I, 18-19. I have used the English edition of George Hayward, M. D., Boston, Richardson, printed by J. H. A. Frost, 1822, in 3 vols. The term "texture" for "tissue" was substituted by the translator under the unfortunate misapprehension that "tissue" did not exist in the English language, although its use has been common since the time of Chaucer and before. I do not quite understand the ". . . combinations four with four . . ." etc. and regret no copy of the original work is available. I mistrust Dr. Hayward's rendering, in places.

other humbug, and to be the possessor of genuine though undemanded qualifications. He went to study in Paris with the determination that when he came home again he would settle in some provincial town as a general practitioner, and resist the irrational severance between medical and surgical knowledge in the interest of his own scientific pursuits, as well as of the general advance; he would keep away from the range of London intrigues, jealousies, and social truckling, and win celebrity, however slowly, as Jenner had done, by the independent value of his own work. For it must be remembered that this was a dark period; and in spite of venerable colleges which used great efforts to secure purity of knowledge by making it scarce, and to exclude error by a rigid exclusiveness in relation to fees and appointments, it happened that very ignorant young gentlemen were promoted in town, and many more got a legal right to practise over large areas in the country. Also, the high standard held up to the public mind by the College of Physicians, which gave its peculiar sanction to the expensive and highly-rarified medical instruction obtained by graduates of Oxford and Cambridge, did not hinder quackery from having an excellent time of it;[7] for since professional practice chiefly consisted in giving a great many drugs, the public inferred that it might be better off with more drugs still, if they could only be got cheaply, and hence swallowed large cubic measures of physic prescribed by unscrupulous ignorance which had taken no degrees. Considering that statistics had not yet embraced a calculation as to the number of ignorant or canting doctors which absolutely must exist in the teeth of all changes, it seemed to Lydgate that a change in the units was the most direct mode of changing the numbers. He meant to be a unit who would make a certain amount of difference towards that spreading change which would one day tell appreciably upon the averages, and in the mean time have the pleasure of making an advantageous difference to the viscera of his own patients. But he did not simply aim at a more genuine kind of practice than was common. He was ambitious of a wider effect: he was fired with the possibility that he might work out the proof of an anatomical conception and make a link in the chain of discovery.[8]

These sentiments have an oddly familiar ring and require but little comment. It is the age-old anomaly: an un-critical public patronized quacks, swallowed their bitter physic, and when they didn't immediately experience sensations associated with immortality, complained not of the quacks, but of the Royal College and the medical profession in general. Not that

[7] The examination fee of the Royal College was, in mid-century, something like £56. If this worked an hardship upon many capable young doctors, it also discouraged a lot of the riff-raff with week-end degrees from a few Scottish universities . . . St. Andrews, for example. The bias for local university graduates who had "walked" hospitals well known to the College, derived from the knowledge that these men were adequately prepared for practice. And if Quackery still had its field-day, no blame attaches to the Royal College. Once a physician was licensed for London practice, he was deemed a reputable physician. If he went in for tractors, phrenology, spiritualism, and astrological medicine after his examination, the College was not to blame. For a quack is less likely to be an imposter, than he is to be a good man gone wrong.

[8] *Middlemarch*, Book II, Ch. 15.

there was not ample room for improvement all along the line. The Pharmacopoeia of 1788 (6th edition) embodied many advances, but there was still the tendency to treat the disease rather than the patient. The "strengtheners and the lowerers" [9] still held sway, and medicines were still being designated according to whether they were deobstruent or incisive; diluent or attenuant; inviscant or incrassant; astringent or relaxant; refrigerant or calorific. What was worse, a remedy prescribed in one case for its action as an astringent, was likely to be prescribed in another as an attenuant. It made no difference to some practitioners that the contemplated reactions were incompatible and that the simplest reasoning showed the ludicrousness of such treatment. It was this sort of thing that aroused honest men, like Bichat, to disgust and anger.

> There has not been in the materia medica, a general system; this science has been governed by the different theories that have successively predominated in medicine; each has, if I may so express myself, flowed back upon it. Hence the vagueness and uncertainty that it presents at this day. An incoherent assemblage of incoherent opinions, it is perhaps of all the physiological sciences, that which best shows the caprice of the human mind. What do I say? It is not a science for a methodical mind, it is a shapeless assemblage of inaccurate ideas, of observations, often puerile, of deceptive remedies, and of formulae as fantastically conceived as they are tediously arranged. It has been said that the practice of medicine was disgusting; I add further, that it is not in some respects the study of a reasonable man, when its principles are derived from the greatest part of the works on the materia medica.[10]

Lydgate's youthful enthusiasm for reforming Medicine, and to make a name for himself by some great discovery, waned about in ratio with the ascendancy of his domestic difficulties. Also, Lydgate possessed none of the qualifications to become a reformer except his zeal. He was perhaps headed in the right direction, but he was temperamentally unfit for conducting a crusade. True to the class from which he sprang, he was an insufferable egotist and offensively off-handed in dealing with his colleagues at Middlemarch. He brought the objectionable qualities of the British upper classes down to the middle-class level and kept them on display twenty-four hours a day. He was contemptuous and intolerant, and both his fine heredity and his former environment caused him to act as though he were slumming most of the time. Of course he made no original discoveries, at Middlemarch or anywhere else, and there is no reason to believe that his early ambition to stay free from the truckling and the intriguing of the City doctors, was realized. And in this not parti-

[9] *Middlemarch*, Book II, Ch. 15. [10] Bichat, *ibid.*

cularly cheerful picture of a young doctor from 1829 to 1852, there is no moral to be drawn and no point to be made. Lydgate was but one of a score of characters in *Middlemarch* whose career is reviewed objectively and with a complete lack of prejudice. In Lydgate there lies no moral lesson, in *Middlemarch*, no thesis.

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I do not feel that there is anything particularly remarkable in George Eliot's detailed account of Xavier Bichat. It is simply a highly realistic touch in a study of county life that would not have been complete without touching upon the state of medicine of that period. Nothing would have been easier than for Eliot to ask some medical man for the name of an exotic medical pioneer to serve as an idol for Lydgate. Nothing would have been easier for the medical man to do. I confess, however, that I was startled to find Bichat in *Middlemarch*. I think that selection was deliberate because Bichat was a foreigner, Bichat was an innovator, and Bichat was in 1829 long dead and it was fitting that he should inspire an enthusiasm in Lydgate.

In all events, it is sure that George Eliot did not interest herself in medicine and its history for any personal preoccupation of her own stemming from disease or dissatisfaction with doctors. It is, however, apparent that she was never in a state of glowing health, and that she made complaint in her personal correspondence and diary of a variety of symptoms. These, collected by Dr. George M. Gould in his *Biographical Clinics*,[11] were: headache and malaise; indigestion, dyspepsia, biliousness, insomnia, sore throats, colds, lumbar neuralgia, influenza, chills, fatigue, hemicrania, palsy, and melancholia. This not unimpressive calendar of complaints extends from her 20th to her 61st year. These I will refer to as symptoms. Formidable as the list appears, it is a record of four decades, and that's a long time. When George Eliot died, in 1880, her physician, Dr. Andrew Clark, a popular practitioner in her set, diagnosed pericarditis from sympathetic inflammation of acute laryngitis, and so certified the cause of death. There was no post mortem.

Dr. Gould, in the *Biographical Clinics*, studied the works of 14 great Victorians: De Quincey, Carlyle and Mrs. Carlyle, Darwin, Huxley, Browning, Wagner, Francis Parkman, Spencer, Margaret Fuller, Nietsche, Whittier, George H. Lewes, and George Eliot. In each instance he has concluded that the subject suffered from eyestrain of one type or another, and in the instance of De Quincey, Darwin, Parkman, and

[11] Philadelphia, Blakiston, 1904, II, 57-83.

Nietsche, at least, there does not seem to be much question about the aptness of the diagnosis.

But the case of George Eliot, and that of George Lewes, her lover, is debatable. Dr. Gould assigns to presbyopia the specific reason for their complaints, and alleges that both Eliot and Lewes were so worn down from twenty years of presbyopia that they both succumbed to affections that under different circumstances would not have been fatal. He also makes much of the fact that both died at the age of 61, although this seems more of a coincidence than anything else. If, indeed, it is anything more than a simple incident. Everybody has to die some time.

The weakest department of this diagnosis is the source of the history. Every lawyer knows the axiomatic refrain upon the fallibility of human testimony; many doctors, no doubt, are aware that there are some patients who both manufacture and withhold symptoms, for a variety of reasons, which is one of the reasons why mail-order therapy won't work.

In the Victorian era, it was fashionable to enjoy delicate health, almost as fashionable as in Richardson's hey-day. The full faint had suffered a decline, but other morbid symptoms continued to enjoy popularity in direct ratio to their gentility.[12] Of Eliot's alleged symptoms, indigestion, dyspepsia, biliousness, and palsy are of very dubious genteel acceptability and were probably genuine. Of "malaise" there is some doubt; if it be used (improperly) as a euphemism for vomiting, it must be placed on the genuine list. For, along with incontinence of urine and/or feces, and constipation, nothing was so ungenteel as puking on the floor . . . or even talking about it.

The complaint of headache may be taken with a grain of sodium chloride. The ladies have been using that excuse for their delinquencies for untold millennia. The practical reason for its popularity is obvious: it was a harmless and not a dangerous symptom; it afforded absolutely no chance for verification; and it could be turned on or off at need like a water faucet. Furthermore, everyone knew and everyone knows that harmless or not, a real sick headache will incapacitate one hundred percent.

The more morbid symptoms were popularized through the Gothic novels rather than through the sentimental types. Insomnia, melancholia, extreme pallor, moderate emaciation, and other symptoms of malnutrition and maladjustment, were highly valued and assiduously cultivated. But moderation was the watch-word; your Victorian esteemed the genteel

[12] The best exposé of this sort of affectation is found in *Pamela's Daughters*, by Robert F. Utter and Gwendolyn B. Needham, New York, Macmillan, 1936.

degeneracy of romanticism, but he liked his comfort. As long as it didn't put him to trouble, in that Emerald Isle the dark-haired, dark-eyed, sorrowful-looking character enjoyed a popularity unprecedented in England and equalled abroad only by the Gallic enthusiasm for the same morbid type. In England, this type was Byronic; in France, it was exemplified by Dumas Fils' "Anthony," the personification of romantic bastardy, though foreshadowed by Chateaubriand. The genteelly morbid was an object of admiration for all of Western Europe. And the enumeration of morbid symptoms in letters and journals had by mid-century assumed the proportions of a favorite indoor sport.

It is therefore doubtful whether George Eliot's complaints are always to be taken seriously. Furthermore, the Cross edition of Eliot's letters and journal, from which Dr. Gould worked, is well known as the sorriest piece of editing of its century. Cross, who married George Eliot the year of her death in a wedding of May and December reversed, set himself up as a censor, rigidly suppressing the entire quarter-century Lewes-Eliot letters and making such additional suppressions, additions, and alterations as were dictated by a prissy conscience and a fine zeal for gentility. There is no reason to believe that Cross dubbed in Eliot's complaints of ailing health, but there is no reason to believe that he did not. He was quite capable of doing anything for any reason or no known reason. If there is one point of common agreement among Eliot students, it is that

> . . . the three bulky volumes of George Eliot's journal and letters edited by Cross is, for the major part, so dreary a chronicle, so "edited" of things vital (if there were any!) and so maddeningly repetitious of the "headache refrain" as to be depressing in the last degree and not at all on a par with the charming literature written about George Eliot and Mr. Lewes by their friends and acquaintances.[13]

In the case of each of these 14 Victorians, Dr. Gould has found eye-strain. On the other hand, Goethe, Kant, Humboldt, Zola, Henry James, ". . . and hundreds of other literary laborers . . ." were unaffected. But how does Dr. Gould know they were unaffected? It is hard to believe that he has examined the personal writings of all these Victorians. And he never claimed that he had. Dr. Gould did estimate that one "literary laborer" out of ten was so afflicted; if this be a correct estimate, for the 14 persons treated in the *Biographical Clinics*, there would be approximately 140 who suffered no eye-trouble at all. It is hardly reasonable for us to assume that out of the hundreds of Victorians who have left their published papers accessible, Dr. Gould contrived to hit upon 14

[13] Clara E. Laughlin, *Stories of Authors' Loves*, Philadelphia, Lippincott, 1902, I, 143.

positive eyestrain cases out of 19 trials (considering Goethe, Kant, Humboldt, Zola, and James as among the trial cases), when the odds lay ten to one. Apparently, if we continue to assume that Dr. Gould used the try-and-see method, some factor other than mathematical probability operated in the trials. And if Dr. Gould had indicated what factor that was, or left some explicit remarks concerning the selective system he used, his findings would perhaps stand up better under objective analysis. If but one person in ten, in the white-collar or literary class alone, is affected by eyestrain, this relatively small percentage does not justify the writer's contention that eyestrain is one of the most common and grave afflictions visited upon humanity, that it cripples us in youth and hastens us from a premature middle age to an early grave. The findings do not substantiate the thesis.

And there is some indication that Dr. Gould has accepted every scrap of positive evidence to the exclusion of anything indicating an opposite conclusion. Everything was grist for his mill if it was of a positive nature. I believe that by this selective method, it could be demonstrated with equal facility that John Milton suffered from eyestrain during the 22 years of his blindness. This is because any combination of Eliot's symptoms, or all of them, while they may be applicable to eyestrain, might equally well be attributed to a variety of other disorders, functional and organic, and on the contrary, might be symptomatic of no real disorder at all. Who has not had a rotten headache a few times a year for no good reason at all? Indigestion is perhaps an indirect warning of eyestrain, but it is also symptomatic of appendicitis, ulcers, and dill pickles at supper. Disappointments of the day bring insomnia by night. And there's nothing like a good old-fashioned hang-over to produce every symptom George Eliot mentioned and a dozen or so more in the bargain.

The medical profession in general, through the book-review sections of the leading periodicals of the United States and medical journals, rejected the diagnoses embodied in volume the first of the *Biographical Clinics*, as Dr. Gould himself brings out in the preface to volume the second, the concensus being that the writer was biassed from the beginning. I have no reason to suspect that the medical journals in any way altered their original opinion on the appearance of the second volume, in which, not unnaturally, Dr. Gould got mad and poured it on. The *Biographical Clinics* are replete with facts that, on the surface of things, seem to justify a positive presbyopic diagnosis. But those very facts are not integrated with certain other facts which might make them susceptible of a totally different interpretation. It is a fact that George Eliot's papers,

as edited by Cross, contain frequent allusions to headache and malaise, but it is also a fact that such allusions were fashionable in the intelligentsia, especially amongst the lady novelists; and it is also a fact that the ladies have been pulling off that sick-headache gag since time immemorial, and it is the commonest and lamest of all excuses. It is also a fact that for a presbyopic subject, George Eliot certainly turned out a mass of literature, presbyopia or no presbyopia, at a time when there were no typewriters or incandescent lighting; and that her period of the most intense and prolific literary out-put was precisely that of the onset and duration of presbyopia (40-60 years), and it is a strange coincidence that her death at the age of 61 extended into the period when presbyopia lets up, and at a time when she herself was writing of how well she felt. This clinches the argument, for Dr. Gould. I regret that I am too obtuse to follow the reasoning here. The *pièce de résistance* for Dr. Gould is that even during the recuperative period, her constitution was so undermined by the ravages of her past eyestrain that she was unable to withstand the ravages of a simple sore throat *after* the presbyopia stopped and while she was recuperating, how was she able to withstand the influenzas and the colds and the sore throats while the eyestrain was afflicting her the most? Relapses are, of course, common, and in many instances may be predicted with a high degree of certainty, especially in operative cases. But in alleged cases of George Eliot's nature, and under the particular circumstances, involved, this type of fatal relapse seems highly improbable. It is hardly reasonable to assign to an arrested case of presbyopia the specific responsibility for a terminal pericarditis, especially when the patient is 61 years of age. No one has yet succeeded in living forever, or even coming close to it; the life expectancy of a female born in England in 1819 was considerably under 61 years. And George Eliot had lived a life of intellectual activity and intense cerebration practically from childhood. Mental as well as physical activity plays a rôle in human mortality. If Life is really definable in Bichat's terms as the sum total of all the organic forces that resist Death, the converse also holds, i. e., Death is the cumulative effect of every force that threatens Life, and every organic process from the moment of conception to the last earthly breath is just another stage in the orderly progression from the oblivion interrupted by conception, to the oblivion recommenced by Death.

Whether there were any secondary causes of George Eliot's death is debatable. Death has sometimes been considered both cause and effect. People get old, and just die. Some get older faster than others, even if they live right and don't smoke and get plenty of fresh air and simple food.

I do not think 61 years is so brief a mortal span that we have to probe into the deceased's past to formulate a hypothesis to explain her death at that age. George Eliot didn't make the three score and ten. Whether she had presbyopia or not, she worked hard at living and at writing through sheer necessity. She was a free-lance, a money-writer, who lived on royalties. The consistent excellency of her work and the regularity with which she published tell against Dr. Gould's eyestrain hypothesis. But if an eyestrain condition actually was present, what warranty is there that it was an effect rather than a cause? Dr. Gould has assumed that Eliot's indigestion and visceral symptoms proceeded from the presbyopia. But could it not have been vice-versa? We have heard much since the turn of the century of psychic maladjustments and the variety of general symptoms that arise from them. And it has not been so very many years since chronic constipation (too un-genteel to be mentioned in Eliot's day) was designated as a prime cause of headache and general fatigue. The advocates of focal infections, too, might have a word to say about the symptoms complained of. Dr. Gould would have effected instantaneous relief and permanent cure of Eliot and the 13 other Victorians, by prescribing the proper spectacles. But is it not mighty peculiar that Dr. Clark, and Sir Henry Holland, and Sir James Paget, serjeant-surgeon to Queen Victoria, did not think of this themselves? Both Eliot and Lewes were their own patients. These physicians weren't reduced to making paper-diagnoses decades after Eliot's death; they had the patients under actual observation.

All things considered, Dr. Gould's eyestrain diagnosis rests on an insecure foundation. It seems more probable that George Eliot died at the age of 61 after a full life and at not an early age, from an inflammation of the pericardium.

SPEECH-TEMPO AND HUMOR IN SHAKESPEARE'S ANTONY

JOHN W. DRAPER*

Many Elizabethan writers on physiognomy, medicine and astrology associate a certain type of personality, and thus a certain humor, with a certain type of speech or voice, and thus with a certain tempo of delivery. " Dr. Arcandam," for example, associates a " strong " voice with " Graue, iniurious "—presumably choleric—persons; a voice " Soft and lowe " with " gentle " (phlegmatic?) persons; and a voice " Graue and moderate " with " Strong " (sanguine?) persons.[1] In general agreement, Hyll associates a loud voice with an " yreful," that is, choleric, type,[2] and elsewhere declares that those that are choleric and " hote " have a " voyce loude, mightie and great of strength." [3] On the other hand, the cold phlegmatic sort, who are " feareful " and " gentle," have a soft and " small voyce." [4] Lemnius remarks that men of " natural " melancholy are taciturn, of moderate melancholy are witty and eloquent, of " unnatural " melancholy inclined to frenzy,[5] and that dry men—presumably melancholy—have a " voyce feble and slender and sometyme squeakinge." [6] Dariot, likewise, imputes " few woords " to the melancholy type,[7] and calls the mercurial " stammering," [8] the sanguine " graue," [9] the choleric under Mars " violent . . . rash." [10] In short, these writers agree not only in associating a given character or humor with a given type of voice, but also in imputing to choleric men a loud and violent and presumably rapid speech, and in imputing to phlegmatic persons, on the other hand, soft, low and gentle and presumably slower delivery. Such ideas, shared by authors in three highly popular sciences, must have been common property to the Elizabethans.

The present writer maintains that the speech-tempo of Shakespeare's

* From West Virginia University.

[1] *The Most Excellent Book of Dr. Arcandam*, London, 1592. See appended " Phisiognomie."

[2] T. Hyll [Hill], *Contemplation of Mankind*. London, 1571, fol. 121r.

[3] *Ibid.*, fol. 4v.

[4] *Ibid.*, fol. 5r and 121.

[5] Lemnius, *Touchstone of Complexions*. London, 1576, fol. 146v *et seq.*

[6] *Ibid.*, fol. 75v.

[7] C. Dariot, *Iudgement of the Starres*. London, 1598, sig. D 2r.

[8] *Ibid.*, sig. E 1r. [9] *Ibid.*, sig. D 2v. [10] *Ibid.*, sig. D 3r.

verse can more or less be calculated chiefly by counting the slurrings of words and phrases that the meter requires. Sometimes, moreover, the abbreviated forms of the early texts furnish a clue, and sometimes grammatical ellipses. When one pronounced *sprite* (often spelled *spirit*) for *spirit*, or *I'll* for *I will*, one must be speaking rather fast; and, when an early text reads *for't*, it implies speed. When Antony exclaims, "Grates me: the sum," he is impetuously demanding that the messenger summarize his report, and he uses an elliptical style that implies the most rapid speech. *Mutatis mutandis*, when these evidences are lacking, and the meter requires *I will*—no matter how the printer chose to spell it—the speech must be slower. Thus the present writer ventures to plot the comparative speed not only of a speech but of an entire rôle, compare the speeds of contrasting rôles, and show at times a definite relation of tempo to situation and character. In the following passage from *Antony and Cleopatra*, Antony is urging his followers to flee; and his haste appears in the three slurrings of "treasure's," "follow'd," and "mutiny" (pronounced in two syllables) and also in the omission of the verb in the last clause. Thus four items of evidence show the speed with which Shakespeare expected these five lines to be delivered:

> . . . be gone:
> My treasure's in the harbour, take it. O
> I follow'd that I blush to look upon:
> My very hairs to mutiny, for the white
> Reprove the brown for rashness, and they them
> For fear and doting.

Such items of evidence for fast or for slow speech can be counted, ratios computed, and an entire rôle adjudged as generally fast or slow; and the speed of each scene or separate dialogue can also be computed, and its tempo related to the situation and to the speaker's mood; for in the preceding passage, the rapidity of Antony's speech clearly arises from the exigencies of his defeat and fallen fortunes and his resultant bitterness. Thus tempo can be an important clue to characterization.

In *Othello*, moreover, Shakespeare seems to associate speech-tempo with situation and with character;[11] and, since the basis of characterization in his plays was the Galenic psychology of the humors accepted by his age,[12] one might expect some correlation, at least in the highly indi-

[11] See the present writer, "Speech-Tempo in Act I of *Othello*," *W. V. Phil. Bull.*, 1946; "Changes in Tempo of Desdemona's Speech," *Anglica*, Aug., 1946; and "Patterns of Tempo in *Othello*," *Jour. Hist. Med.*, about to appear.

[12] See the present writer, *The Humors and Shakespeare's Characters*, Durham, N. C., 1945.

vidualized figures of his later work, between speech-tempo and humor. *Othello* is a tragedy of varied choleric types; and these choleric personalities, when circumstances encouraged their free expression, show their humor, not only in gesture and action and what they say, but also in their fast articulation.[13] As jealousy brings out Othello's choler, his speech grows fast; as misfortune dulls and overwhelms Cassio and Desdemona, their speech grows slow; Iago's choler, on the other hand, is of the "hidden" sort, and he dissembles it, not only in word and deed but also in the slower tempo of his insinuating speech. Thus seemingly, the outward limbs and flourishes of choler were a more rapid tempo; and the heat and violence of the humor was thought, quite reasonably, to excite the speaker to fast and even furious utterance. At the other extreme from martial choler was the humor phlegm, associated with dolts, children, women and lovers: whereas choler was hot and dry, phlegm was cold and damp; and whereas choler was violent, phlegm was placid, and therefore should be as slow in speech as choler was quick and hasty. Although Shakespeare supplies many phlegmatic characters, a good example for testing this theory is not easy to select: it should not be a figure in too early a play; for a study of *Romeo and Juliet* suggests that Shakespeare did not associate his tempo-patterns with plot and character in his earlier work;[14] it must not be too complex a character, or one that assumes a humor other than his own, for that would not give a clear enough indication; and it must not be a character that speaks chiefly in prose, for meter yields the chief evidences of tempo. The rôle of Antony in *Antony and Cleopatra* seems to evade these difficulties, and is, moreover, a clear example of the phlegmatic type, the sabyrite enmeshed in the lures of Cleopatra: he "is become the bellows and the fan To cool a gipsy's lust."[15] One might, therefore, examine both the amount and the quality of the evidence for Antony's tempo in order to ascertain his average speed act by act and scene by scene and also to note whether those scenes in which he is most phlegmatic and voluptuous are those in which his speech is accordingly slower. A comparison, moreover, of his tempo with Cleopatra's and with the Anthony of *Julius Caesar* might be significant.

As indicated in Hamlet's advice to the players and in the Prologue to *Romeo and Juliet*, the Elizabethan actor spoke his lines with a tripping tempo; and Antony's speech in the four acts in which he appears seems

[13] "Patterns of Tempo in *Othello*," *cit. sup.*

[14] See the present writer, "Contrast of Tempo in the Balcony Scene," *Sh. Bull.*, about to appear.

[15] See the present writer, *The Humors and Shakespeare's Characters*, Chap. iii.

regularly slower than this Elizabethan norm: for Act I, his ratio of slow items of evidence in proportion to fast is 1 : 2+; for Act II, 1 : 1+; for Act III, 1 :1½; for Act IV, 1 : 1+; and, on the face of it, this would seem to bear out a correlation between tempo and humor. It is indeed a contrast with the 1 : 6 speed of the choleric and jealous Othello. Some of Antony's individual scenes, however, show variations: in some of these, he speaks too little for the ratios to be significant; but, in Act I, Scene ii, where the count runs 9 slow to 25 fast, or 1 : 3-, another explanation is required: the news of the war in Italy and of the death of his wife Fulvia and his consequent determination to break with Cleopatra and leave for Rome all shock him from phlegmatic complacency. Of Antony's 22 scenes in the play, eight show a comparatively fast ratio of about 1 : 2, but, in these scenes, Antony appears largely as a soldier or a diplomat, or as trying to break away from the Egyptian charmer. Act I, Scene i, with 6 slow items to 12 fast, is a combination of love and politics; the next scene, with its 9 slow to 25 fast, shows Antony breaking away for the time from Cleopatra and planning to return to Rome; and the following scene shows the quarrel between the lovers at his departure. These two latter scenes portray Antony the politician rebelling against Antony the lover; and, as he is less phlegmatic, he speaks faster. In Act II, Scene vii, the ratio for fast speech rises to the proportion of 6 to 14. This is the scene of the conference and feast on Pompey's galley: Antony speaks but little and part of that in prose; and his greater speed doubtless arises from the political nature of the occasion; for, though feasting, he is more the politician than the sabyrite. Act III, Scene vii runs 4 to 12, and shows the preparation for battle; and Scene xi portrays his bitterness at defeat and his quarrel with Cleopatra over her desertion. In Act IV, Scene iv, the proportion is 7 to 14 as Antony prepares to fight Octavius; and, in Scene xii, all is lost, and he dismisses his soldiers. In short, these scenes in which Antony's speech is faster show him in revolt against his mistress or engaged in the more active and manly pursuits of politics or war. All this is in utter contrast to his speech in the last great love-scene (Act IV, Scene xv), which yields 11 evidences for slow speech to 5 for fast; and his famous farewell, "I|am dy|ing Egypt, dy|ing . . ." contains no less than four evidences of retardation. Antony bleeds to death, not as the choleric soldier or the shrewd politician, but as the phlegmatic lover. In short, Antony with soldiers or in battle has a ratio of 1 : 3—; in politics, with Lepidus and Octavius, a ratio of 1 :1½; in dalliance with Cleopatra, 1 : 1¼. Thus when he is more phlegmatic, he is slower; and

the situation and his momentary mood seem to govern the tempo of his speech. Indeed the very rhythm of the dialogue subtly reflects both plot and character.

The mere statistical computation of items of evidence unfortunately cannot take into account the important matter of their comparative quality; for some of them are bound to be much more cogent than others: for instance, such words as *nation* and *remarked*, each pronounced in two syllables as in modern speech, were occasionally spoken in three syllables by the Elizabethans; and the two-syllable form, being very common, is only the slightest indication of rapidity; whereas the three-syllable form, being rare, implies an extremely retarded speech. Therefore, the quality of the evidence, as well as its quantity, should be taken into account. In Antony's amorous farewell to Cleopatra, for example, which is phlegmatic and generally slow-spoken, even the items that suggest speed are too commonly slurred in Elizabethan speech to be strong evidence: " o'erthrown," " triumph'd," " lived," " vanquish'd," and " spirit " (pronounced according to the meter in one syllable). On the other hand, " I am," " dying," " upon " (instead of *on*), " miserable " (in four syllables) and " spirit is " are not only fairly strong evidences of slow but also evidences of smooth, *legato* speech—a delivery in which varied rhythm gives way to verbal melody; and, indeed, Antony's words in this last scene are rich in alliteration and in the melodious echoing of words and of the vowel-sounds I [ai] as in " dying " and EE [i] as in " Egypt " and " sweet Queen." This *adagio* style of Antony the lover, musical, slow and even, contrasts with the more pointed and varied rhythm of Antony the politician and the soldier. In Act I, Scene ii, for example, one of the fastest in the play, in which he breaks away from Cleopatra to go to Rome, he uses such extreme slurrings as " opposite " in two syllables, " being " in one, " Enobarbus " in three, " expedience " in three, " Fulvia " in two, " given " in one, " slippery " in two and " quality " in two, altogether eight rather extreme slurrings in 45 lines of verse; whereas the twenty lines of his impassioned farewell to Cleopatra contain only such common slurrings as " o'erthrown " and " spirit " in one syllable. In short, not only the small number but also the common types of slurring in the love scenes suggest the slower speech of a phlegmatic Antony. In these scenes, moreover, the weakness of the individual evidences for speed, as well as their paucity, suggests a flowing, *legato* style, *andante* or *adagio*.

One might ask whether this slow and even style of Antony in his love-scenes contrasts with a more *rubato* and faster style of Cleopatra, whose

"infinite variety" implies a mercurial temper;[16] for surely the mercurial temper should express itself in a variable style. Most of these scenes between Antony and Cleopatra are given to lovers' quarrels, or are consumed with war or politics rather than love; but their last scene when all is lost and Antony is dying is the *Liebestod* of the tragedy, beyond the horizon of war and diplomacy. Here Cleopatra's tempo is 1 : 2, and Antony's 2 : 1. Relieved of external pressure, both lovers express their inner selves, the one phlegmatic and *adagio*, the other with a quicker, more varied rhythm. Within three lines, she has the slow "dare not" and "taken" in two syllables and the doubly slurred "th'imperious" in three syllables and "full-fortun'd" in three, followed by the unslurred "ever" in two syllables. Later, within a single line, she uses the longer form "upon" and then slurs "Antony" into two syllables. The first line of the next speech yields "Here's sport," and the second "Our strength is." In short, this great scene provides a brilliant contrast, comparable to the last scene of *Othello*: the slow and even speech of Antony, expressive of his amorous character and his ebbing life, and the varied rapidity of the mercurial Cleopatra. Just such a contrast of tempo Shakespeare used in the Balcony Scene in *Romeo and Juliet* to set off the two lovers; but here the difference of rhythm is grounded in the characters and situation of the speakers and is not a mere theatrical trick of style.[17]

The Antony of Shakespeare's *Julius Caesar*, written some ten years earlier, appears in the play as a politician and a soldier; but Cassius at least twice glances at Antony the voluptuary, "a masker and a reveller"; and Shakespeare, torn between conflicting indications in Plutarch's *Lives*, seems to have steered an uncertain course between Antony the politician, Antony the soldier and Antony the sabyrite; but, on the whole, the first of these appears to dominate. He should, therefore speak at least as fast as in the political scenes of *Antony and Cleopatra*. He hardly enters the play before Act III; and then he appears uncertain of his status right after the assassination, and his speech is very slow, in fact a ratio of 1 : 1-. The famous funeral oration which follows in the next scene is even slower. In fact, it starts with the extraordinary tempo of 5+ : 1, partly because Antony is (or pretends to be) overwhelmed with grief, and partly because he is feeling his way with the mob. Their interruptions cut the oration into seven parts; and these on the whole go faster as Antony gains a

[16] *Ibid.*, 92-93.

[17] See the present writer, "Contrast of Tempo in the Balcony Scene," *Sh. Bull.*, to appear.

surer hold of his audience and warms up to his subject. The ratios start as follows: 5+: 1, 3-: 1, 4: 1. Beginning with the much-quoted line, "If you have tears . . . ," he seems to feel sure of success, and starts to incite the mob to violence, and the ratios grow faster: 1: 1-, 1: 1+, 1: 1-, 1: 2. They do not, however, go nearly as fast as Othello's fury—perhaps because such frenzy seemed hardly fitting in a set oration delivered in the classical style. In the scene that shortly follows with Octavius, Antony achieves only a speed of 1: 1+; and, even in the battle scenes of Act V, his average is but 1: 1-: surely such a choleric occasion should have made his speech much faster—unless Shakespeare strangely intended his tempo to accord with an amorous aspect of his character that is not presented in the plot. In short, Shakespeare, though he shows a keen sense of timing in the funeral speech, does not seem to associate humor and tempo in the Antony of *Julius Caesar* as he does in the Antony of the later play. Apparently, this subordination of tempo and delivery to character and situation developed in Shakespeare's art between the writing of *Julius Caesar* about 1598 and the composition of *Antony and Cleopatra* some ten years later.

As any professional actor knows, even in the crudest play, the timing of the lines is all-important; and, in poetic drama, the subtleties of rhythm make this the *summa* of histrionic art. The very life of good dialogue is contrast, not only in content and in length of speeches and in length of breadth-groups within speeches, but also, within each sentence and even phrase, the contrast of slow and fast and of *legato* and *rubato*. In great drama, furthermore, where all effects should grow from a single theme and plot and group of characters, these nice contrasts of style should reflect the individual inner essences of the conflicting characters and their fine changes as the events of the plot impinge upon them. The Antony of *Julius Caesar* presents some contrasts of tempo, and shows the orator quickening his tempo as he feels surer of the mob: his timing, therefore, has some relation to plot but little or none to character; but, in *Antony and Cleopatra*, the tempo of Antony's speech shows not only a fuller reaction to his situation than it does in *Julius Caesar* but also, in its generally slow movement, accords with the voluptuous, phlegmatic Antony that the tragedy presents, and vividly contrasts with the faster and more variable—and mercurial—Cleopatra. This growth in Shakespeare's art and his association of speech with character, set forth by the popular science of the day, is quite what one might expect; and the reasonableness of these results suggest that the method of the present study and the computation of ratios of tempo have some validity and significance in the study of Shakespeare's art.

TEXTS AND DOCUMENTS

THE PREPARATION OF THE HUMAN SKELETON BY ANDREAS VESALIUS OF BRUSSELS

AN ANNOTATED TRANSLATION OF THE 39TH CHAPTER OF THE *De humani corporis fabrica*, 1543

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INTRODUCTION

The penultimate chapter of the first book of Vesalius' *De humani corporis fabrica* (Basel, 1543) on the preparation and articulation of the human skeleton is of very great biographical, technical and scientific interest. The publication of this chapter established the standard technique of osteological preparation which, with but little change, has remained to our day in the form of the mounted skeleton as the most familiar symbol of the new Vesalian anatomy. This chapter is however unique in another respect. It is the first writing, so far as we are aware, in which a laboratory procedure is disclosed completely and in detail for all to follow. When one thinks of the jealous secrecy as to methods adopted by so many in succeeding times, such as Frederic Ruysch, the importance and modernity of spirit exhibited in this communication is better appreciated. Furthermore Vesalius' final recommendation to the student of natural philosophy to proceed to the preparation of the skeletons of primates, mammals, birds, reptiles and fishes for the better understanding of Galen and Aristotle indicates his great interest in the broader problems of comparative anatomy. We know that he prepared the skeletons of several of these forms [cf. note 16], and nowhere is his deep knowledge of comparative anatomy more apparent than in the *China Root Letter* of 1546. These recommendations were to bear almost immediate fruit in the work of his lineal descendants, Coiter (1572, 1575) and Runini (1598), to say nothing of Belon (1553), Rondelet (1554, 1555) and Salviani (1554–57). Indeed Vesalius' remarks are very reminiscent of the constant urgings of Coiter for the comparison of human anatomy with that of

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beasts as an occupation worthy of a philosopher and which enabled him to elevate the study of comparative anatomy to the rank of an independent branch of biology.[1] Justly therefore it is to Vesalius that we must accord the honour of introducing the beginnings of laboratory methods into biological science.

The attitude of church and state towards anatomical dissection in the pre-Vesalian period is difficult to determine with any degree of precision and certainty. In the two centuries from the opening of the great anatomico-surgical school of Bologna to the time of Vesalius himself, church opinion and tolerance of the practice seem to have varied in different parts of Europe, and much would appear to have depended upon the relative power of ecclesiastical and secular authorities at any given time. In general, dissection was not commonly practiced during the fourteenth century except in the north of Italy where the temporal power of the church was on the wane. Indeed there is evidence from as early as 1308 of the issuance by a lay body, the Venetian Senate, of a permit for an annual dissection,[2] whereas elsewhere papal indulgences were necessary, and at Strassburg as late as 1517 permission was granted by the magistrates despite papal prohibition.

Charles Singer[3] has emphasized that early dissection at Bologna was initially post-mortem examination as a part of a forensic process to determine the cause of death and that this procedure passed imperceptibly into the examination of the body for anatomical purposes. We believe that it is important to recognise that even up to the time of Vesalius' investigations, sanction granted and precedent had firmly established an anatomy as no more than the equivalent of an autopsy. These limitations are clearly apparent in the work of all down to the publication of the *Fabrica*. Therefore within these limits Mundinus, 1316, set the style of the "method of an anatomy" which, to use the conceit of William Harvey, consisted of "first, the ventris inferno, nasty yet recompensed by admirable variety, secundly the parlour [thorax] and thirdly the divine banquet of the brain." Anything more would constitute desecration of the body and would tend to oppose the idea of resurrection. Thus at Padua as late as 1578 there was an official prohibition placed on pathological anatomy since a certain "Emilio Campologno had carried away to his house . . . the uteri" of female patients who had died in the hospital, and "the surviving old wives raised a great clamour" because they dreaded the

[1] F. J. Cole, *A history of comparative anatomy*, London, 1944, p. 73.
[2] H. Haeser, *Geschichte der Medizin*, Jena, 1875, I, p. 734.
[3] *The evolution of anatomy*, New York, 1926, p. 70 ff.

absence of the uterus after resurrection which would deprive them of fecundity in eternity.

Anatomies carried out in the Mundinus tradition had become fairly commonplace in the latter part of the fifteenth and the beginning of the sixteenth centuries. It was perhaps more than a lack of scientific curiosity and the restraining hand of written authorities which rendered so restricted a procedure acceptable but also the necessity of preserving, even in the case of a condemned criminal, at least the outward and superficial appearances of the body for Christian burial, as is indicated, for example, in the expense accounts of the records of the Faculty of Medicine at Paris, 1492–93.[4] It is against such limited methods that Vesalius rails both in this chapter and in the preface to the work, and he is especially caustic of another procedure, namely the use of specimens of the extremities macerated in water or dried in the sun, as was also advocated by Mundinus,[5] and which were imposed on students of medicine by these "Rabbins" of the art. Contrary to expectations, considering the relative permanence of the skeletal system, there is no part of the body more inadequately handled by the pre-Vesalian anatomists. As is well known, this was due to the influence of the decretal of Pope Boniface VIII, *De sepulturis*, issued in 1300, which, although directed against the practice of boiling the bones of distinguished persons who had died far from home, in order to render the body more easily transportable for burial, was interpreted as extending to anatomical pursuits.[6] While the papal decretal dealt with a subject completely unattached to dissection, yet it had the tendency still further to restrict dissection to the superficial examination established by use and wont under current conceptions of desecration of the body. It is true that Guy de Chauliac mentions boiling of the bones in association with other methods of preparation, such as drying in the sun and maceration in lime or running water, but is he not repeating traditional information derived from the Bologna school? Was the method of preparation in lime, mentioned with such contempt by Vesalius and apparently customary in his time, but a subterfuge to circumvent the letter of the edict against boiling? Whatever be the truth, we cannot but be impressed by the secrecy with which he obtained his first skeleton by robbing the gallows and proceeded to its preparation by boiling until, rendered bolder, he openly advocated the restoration of this technique.

[4] E. Wickersheimer, *Commentaries de la faculté de médecine de l'Université de Paris, 1395–1516*, Paris, 1915, p. 348.

[5] *The Fasciculo di medicina*, Venice, 1493, ed. Charles Singer, Florence, 1925, part I, pp. 48-9, 60, 97.

[6] Cf. *Fasciculo di medicina*, ed. Singer, I, pp. 49, 96.

The only other sources of osteological material were of course the charnel house and the cemetery. There is evidence that grave robbing constituted a sacrilege as violation of consecrated ground.[7] On the other hand, we find Vesalius gaining access to the Cemetery of the Innocents in Paris for the study of the bones where, in view of the proximity of church authorities, he would be under public surveillance. Or were these forays carried out in secret and the bones pilfered? It is however apparent from his opening words that osteological material was obtained with no little difficulty. As Vesalius points out, material from the church-yard is not entirely suitable because of the difficulty of obtaining bones of the same subject. It is abundantly clear from the misarticulations evident in the illustrations of almost every contemporary that the tomb or the remnants of some malefactor picked up by the wayside were the exclusive source of osteological material. He therefore considers himself most fortunate to have been able to obtain the bones from a relatively intact skeleton and only made possible by the unique circumstances surrounding the execution. There can be little doubt that it was this specimen which provided the model for the skeletal plates by Van Kalkar in the *Tabulae sex* of 1538.

Precisely how many skeletons Vesalius constructed we are unable to say. Nevertheless, in addition to the one at Louvain we know by his own witness of two others. In the winter of 1539–40 Vesalius journeyed to Bologna on the invitation of his friend Andreas Albius, professor in the medical school of that city, and during his sojourn prepared a human and a simian skeleton. [Cf. note 16.] It is thus apparent that at this time he had already begun the regular demonstration of comparative aspects of anatomy which he was to advocate in the *Fabrica* of 1543 and as indicated in the present chapter. In 1539 he was already at work on the *Fabrica*. Moreover, it appears that he wrote the individual books of it in the sequence in which they appear in the published work, and we know from a statement of Falloppius that the first two books were completed before 1541. It is therefore not unlikely that the chapter of the book under discussion was written around the period in which he had constructed the two skeletons at Bologna.

The third human skeleton of which we know is that which Vesalius presented to the town of Basel in 1543. This was the result of an honorary association with the university presented by the rector, and which permitted Vesalius to make dissections and to present to Basel its first public anatomy. The body of an executed criminal, one Jacob Karrar, was

[7] Cf. M. N. Alston, *Bull. Hist. Med.*, 1944: XVI: 227.

employed, and his articulated skeleton was to be seen in its entirety, according to Melchior Adam, up to the year 1620. Portions of it are still preserved to give a kind of immortality to an otherwise forgotten sixteenth century criminal, so that like the criminal dissected in Lyons in 1537 by Rabelais, speaking through the pen of Etienne Dolet, he might echo:

. . . Furat Sors, iam furat:
Honoribus circunfluo.

In the Venesection Letter of 1539 Vesalius speaks of the growing difficulty of obtaining bodies in north Italy. Was this the common protestation of the barriers to an individual's efforts, an almost unconscious request for applause for those efforts, or were there actually increasing difficulties in obtaining bodies?

In the *Fabrica* and the *China Root Letter* Vesalius recounts both the legal and illegal manner in which he and his students at Padua sought bodies for dissection. Not only did his complete dissections ill-accord with the pre-Vesalian post-mortem, but such dissections when coupled with out-and-out grave robbing could not fail to be considered as desecration. It is entirely possible that such efforts at Padua, and no doubt infecting nearby Bologna and Pisa, would tend to arouse the old antagonism. If such activities in the medical schools were in any way effective in reviving religious opposition to dissection, such opposition would unquestionably have been aided by the new reformist zeal and discipline imparted to religious life with the accession of Paul III in 1534. The church, hitherto complacent and willing to allow to its communicants considerable latitude of interpretation, now in the face of the Lutheran threat was becoming increasingly rigid in the application of its controls. Undoubtedly over-zealous reformers would sometimes seek to apply stringent prohibitions even where the letter of ecclesiastical law and decretal did not justify them.

As one hypothesis so frequently leads to another, so the admissions by Vesalius in the *Fabrica*, not only of his method of anatomy, in the boiling of bones but also the manner in which he obtained bodies, causes us to wonder to what extent his entrance into the service of Charles V was a refuge from punishment for the " desecrations " to which he had admitted. Surely an emperor who would permit the sack of Rome would be willing to protect his physician if that physician were personally valuable to him, as we know Vesalius was. But even thus it is said that Charles was perplexed by the question and asked a group of ecclesiastics to decide whether or not human dissection constituted sacrilege. This jury appears to have

been the faculty of Salamanca, which decided in the negative and thus, as in its previous opinion during the course of the venesection controversy, showed its liberal tendency, at least in matters of science.

It has even been suggested that clerical enmity, unable to strike across imperial protection, bided its time and that after the abdication of Charles it was able to have its way with the new king Philip II and compel Vesalius to flee from Spain and seek a safer position under the protection of Venice, a plan to be thwarted by shipwreck and death.

Whatever be the true answer to these questions, the matter of primary significance is the impetus which Vesalius gave to anatomy by his revolutionary procedures, and the value of the skeletal arrangement of the bones as an aid to the teaching and comprehension of anatomy was readily apparent once he had demonstrated its benefits through his personal instruction and through the dissemination of his printed word. The Vesalian technique of articulating a skeleton was rapidly adopted and soon became the standard method and traditional badge of the anatomical lesson. An interesting example of a skeleton mounted in the Vesalian manner is that illustrated in the famous contemporary painting of John Banister delivering a lecture on anatomy at the Barber-Surgeons' Hall in London, 1581. Yet, with respect to osteological material, traditional prohibitions continued to prevail throughout the sixteenth century so that in 1569 the medical faculty of Heidelberg was compelled to pay the equivalent of well over 200 dollars for a skeleton. Indeed the warfare of science with theology was to continue long after this age, and the complete Vesalian procedure was not to be fully acknowledged until the Enlightenment of the eighteenth century.

There is no great difference in content between the version here translated from the *editio princeps* of 1543 and the revised edition of 1555, except that the account in the latter is somewhat abbreviated and less repetitious, but the valuable biographical and personal material is entirely omitted. The sole addition is an illustration of the drill which Vesalius recommends to facilitate the wiring together of the bones.

THE TECHNIQUE OF PREPARING THE BONES AND CARTILAGES OF THE HUMAN BODY FOR INSPECTION

Chapter XXXIX

Physicians who fittingly devote themselves to the Hippocratic art and who are not born for the purpose of prescribing syrups[1] and imposing them on man, are accustomed, with no ordinary labour, to collect bones which are preserved for instruction, whether they intend to examine them connected to one another or each separately. First they usually free the greater part of the flesh from the corpse of a subject who has been hanged or who has died of other causes and cut away the

The method of macerating in lime and then cleansing the bones in running water.

[1] Vesalius opens and closes this chapter with caustic references to the great controversy which was raging at this time anent the therapeutic value of syrups. The word "syrup" is of Arabic origin, and the use of medicinal syrups appears to have been part of Saracenic pharmacology introduced to the west notably in the *Canon* of Avicenna. The theoretical basis of Arabic pharmacology was fundamentally that of the Greeks as elaborated by Galen and, in conformity with humoral doctrine, dependent therefore upon the supposed qualities of a drug. Consequently, when in the early sixteenth century an acrimonious debate broke out between the so-called Arabist partisans and Galenist opponents of the use of syrups, both sides could support their claims by the same classical authorities. The Arabists attempted to justify their use of the syrups on the grounds that the Greeks had employed vehicles of honey with water, vinegar, or wine, such as the famous hydromel of Hippocrates and mulsum of Galen, and regarded the apozemata, syrups and juleps as simple bases varying only in degree of sweetness. They pointed to the great advantage which the syrups possessed in preserving for use at any time the herbal remedies which the complicated therapy of the day demanded. Their opponents, logically following the humoral doctrine to the letter, saw the mutual antagonism of qualities in such concoctions and condemned them on the grounds that they were inappropriate "for all humors, seasons and complexions." According to Servetus (1509–1553) in his *Syruporum universa ratio* (1537), a syrup is "a sweet prepared-potion" used to prepare and draw off bilious humors through purgation. One of the strongest advocates of the syrups at the time was his teacher, the famous French physician Symphorien Champier (1472-1539), who had been bitterly attacked by Leonard Fuchs (1501–1566). Servetus, loyal pupil and friend, rushed to the defence of Champier with his *Apologia in Leonardum Fuchsium* (1536). Here he professes to be following a middle course, avoiding the pitfalls of blind acceptance or rejection of the syrups and calls upon Galen as his chief support. However, he indicates his strong belief in their therapeutic efficacy and refers to them as "the most salubrious part of our art." It would be difficult to regard Servetus as other than a very strong advocate of the syrups. While Vesalius may have been directing a general criticism, repeated at the end of the chapter in much stronger terms, at the proponents of the syrups, yet in view of his intimate association with Servetus at Paris [Joannes Guenther, *Institutiones anatomica* (Padua, 1550) *praefatio*] it is very likely that his remarks are aimed directly at the martyr physician.

viscera without severance of any of the joints. Later they place the dissected body in a long box and fill the whole with lime which they then sprinkle with water. When the box, which has been perforated on all sides by small holes, has been kept in this manner for a week, it is then connected to a rapid stream of water so that the lime, together with the now macerated remnants of the flesh, may in time wash away and everywhere separate from the bones. The cadaver is removed after several days and thoroughly cleansed with the aid of knives so that finally all but the joints glisten. Care should be taken not to destroy any of the bony connections in this operation, and that the ligaments binding the bones (through the medium of which they are held together) be preserved in their entirety. The cleansed cadaver is exposed to the sun in the position in which one desires to examine it, either sitting or erect and arranged in some pose or other, so that the ligaments, when dried by the heat of the sun, may hold the bony articulations in place.

This method of preparation,[2] apart from the fact that it is irksome, dirty and difficult, displays almost none of the bony processes, appendices [epiphyses], hollows, and the rest of the structures of this kind which ought to be examined with special attention, because, of course, all these particular features are now covered by the blackened ligaments. Consequently this method of cleaning the bones is almost entirely unsuitable for teaching. Likewise the ridiculous method of inspecting the muscles, tendons, ligaments, nerves, veins and arteries, (which hitherto the professors of our art have imposed on candidates of medicine), offers nothing of any value and merely restrains the thoughts of students in their desire for a demonstration by these Rabbins of the organs just mentioned. For they claim that these things must be learned from bodies wasted away in streams of water, (if it please the Gods), but not from the recently dead. As if anything worth learning could be obtained from cadavers prepared in this way and indeed corrupted by this method. As if all these things could not be better shown us in a fresh body, just as they customarily demonstrate the superficial appearances of the liver, the intestines or the heart, however ineptly they expose them and at the same time neglect other parts of the body.

[2] The kind of anatomical material utilised in the pre-Vesalian period for the study not only of the bones but also of the soft parts is briefly described by Guy de Chauliac (1300–1368) in his popular and long standard *Chyrurgia*. "We learn from the cadavers dried in the sun, consumed in the earth, or dissolved in running or boiling water, at least the anatomy of the bones, cartilages, joints, the larger nerves, tendons and ligaments" [I: i: 1]. Material of this order was still widely used in Vesalius' day, especially for the study of the anatomy of the extremities. Throughout his writings Vesalius draws attention to the uselessness of such material.

The method of preparing the bones by cooking.

On the other hand, we shall fully describe in its proper place the manner in which other details of the body must be attacked; however, as I shall now add, you will acquire a knowledge of the bones with little effort if, at least, you are desirous of learning, which Galen especially required of the student of dissection, and if you are hard working and industrious.

Often elsewhere but especially in Lib. 3 *de Administ. dissect.*

Therefore when a cadaver has been obtained from somewhere or other, of whatever kind it may be (though one emaciated by disease is regarded as more suitable), you will take care to have at hand a vessel in which to place the flesh, the viscera and skin, and to catch the blood, as well as a large and capacious cauldron which should be of the kind women use for the preparation of lye over the fire, as these are most suitable for cooking the bones. In short, the bones will be thrown into this. Besides the cauldron, a wide piece of paper is stretched on a board so that the cartilages, which are not to be boiled, can be attached to it and arranged in orderly fashion. //

(p. 156) Thereupon you will make a circular incision with a sharp knife through the frontal, temporal and occipital regions, penetrating right down to the skull. You will then saw through the skull at the site of the circular incision, being little concerned even if you damage the brain or divide the skull at a slightly higher or lower level, since at present it is our intention to respect and save but the bones and cartilages. Therefore when the skull has been severed, the brain, avulsed from it by the hands only, should be thrown into the vessel. The part of the skull which has been separated from the head, first however freed from the skin on its vertex, is put into the cauldron. Next each ear is cut off very close to the temporal bone and individually placed on the board to which the cartilages adhere, together with the eyelids and the end of the nose which is formed by cartilages. These structures have to be resected from the bones as well as from the skin to which they are very closely united. Then you free the lower jaw from its connection with the bones of the head, and, by means of a small knife, dissect from the ligaments surrounding the joint the cartilages which we stated exist separately in its articulation with the head. The cartilages are placed in order on the paper to which they immediately adhere.

Divide as in the seventh fig. of chap. 6, if viewed as having been separated from the sixth fig. Since you are properly concerned only with the bones and cartilages, I advise you that there is nothing else of consequence in that chapter.

When removing the lower jaw and while freeing it from the skin and

the tongue (if you prefer, from the attachments of the remaining muscles), and when at length you throw it into the cauldron, care must be exercised not to destroy the bone resembling an U [hyoid] and the larynx. You should lift away the entire larynx together with this bone, from the tongue, from a portion of the oesophagus and the rough artery [trachea], and likewise from the fauces, and you should place them, like the ears, without further cleaning on the board.

Now proceed to make an incision from the point of the pectoral bone all the way to the pubes, penetrating right down to the omentum. To this incision you will then add another which extends transversely from the right to the left flank. Then draw all the structures contained within the peritoneum, without destruction as is the custom of butchers, and throw them into the vessel. Continue to dissect the skin of the abdomen together with the muscles from the bones, and mopping up the blood with sponges, squeeze it out into the vessel.

Now carry a very deep incision from the root of the neck as far as the point of the pectoral bone so that having penetrated down to it, you can lift away the muscles, as well as the skin covering the thorax, from the ribs and their corresponding cartilages, and at the same time the clavicles, laid bare and freed from flesh, will come into sight. The clavicles must be freed with a small and very sharp knife from the pectoral bone, and the cartilages peculiar to their joints (just as was done with the cartilages of the lower jaw) must be accurately removed and then attached in order to the paper.

The pectoral bone together with the costal cartilages will be carefully freed from the ribs after cutting through the cartilages where the bony ribs degenerate into them. This will be executed with facility if only it is not forgotten that the cartilage of the first rib is carried from the middle of the pectoral bone to the side more than the second costal cartilage. Not only must the cartilages attached to the pectoral bone be separated from the ribs, but also all the cartilages of the false ribs which cling to the upper cartilages through the interposition of the intercostal muscles. When the cartilages have been disunited in this manner, elevate the pectoral bone from the root of the neck, and also free it from the veins and arteries passing to it from the throat and, in addition, from the membranes which enclose the thoracic cavity. Finally resect the cartilages from the septum transversum [diaphragm], and without further cleaning place them along with the pectoral bone on the paper. Now you are ready to dissect the scapulae together with the clavicles from the thorax.

Accordingly having carried a long incision in each arm from the

summus humerus [acromion] through the upper arm and forearm as far as the thumb, denude the scapula, humerus, forearm and hand of skin and flesh, not being greatly concerned even if some portion of the tendons or flesh is left still adherent to the bones. The skin of the hand is left intact, for it is sufficient to lay it open here and there with several incisions so that it may be more readily boiled later. Now the clavicles are severed from the *summus humerus* [acromion], paying attention as to whether, apart from the process of the scapula which we call the *summus humerus*, any third bone[3] is encountered here. When you have done this and have attached the special cartilage of this joint to the paper, throw the clavicle into the cauldron and separate the scapula from the humerus, and the humerus from the bones of the forearm. The connection of the forearm to the hand is preserved, and the whole is placed simultaneously into the cauldron. However, before the scapula is placed in the cauldron, you will do well to separate from it the cartilage [labrum glenoidale] which somewhat increases the scapular sinus for the reception of the head of the humerus, and apply it to the paper with the other cartilages.

This procedure should similarly be carried out on the arm of the other side, and once again proceed immediately to the thorax from which first excise the lungs with the heart and diaphragm. Before throwing the heart

[3] The Vesalian term *summus humerus* is of course an almost literal translation of the Greek ἀκρώμιον, the point of the shoulder, as used by Hippocrates [*De artic.*, sect. 13] and Aristotle [*Hist. animal.*, VIII: v: 4]. Rufus of Ephesus [*De part. homin.*, I] states that Eudemus regarded the acromion as being a separate ossicle: Ἀκρώμιον δὲ ὁ σύνδεσμος τῆς κλειδὸς καὶ τῆς ὠμοπλάτης. Εὔδημος δὲ ὀστάριον εἶναί φησι μικρὸν τὸ ἀκρώμιον. Galen in his commentary on the above-mentioned work of Hippocrates, as well as elsewhere [*De ossibus*, xiv; *De anat. adminis.*, I: ii; *De usu partium*, XIII: xi] refers to an acromial bone. However, in the pseudo-Galenical work *Introductio vel medicus*, the acromion is the extremity of the scapular spine only. Sometimes Galen uses the word κατακλείς as apparently synonymous with acromion. This term means literally a door fastening or linch pin, so that he might have reference to the inter-articular disc of the acromio-clavicular joint. Thus up to the time of Vesalius it was generally held that a third bone called the acromion existed in the shoulder region, and Leonardo da Vinci, either influenced by tradition or observing an ununited epiphysis, so illustrates it. Vesalius was the first to recognise the differences in the youth and the adult, and discusses [*Fabrica* (1543), I: xxi: 99 ff.] the possibility of Galen having been misled by the appearances in children, but decides that this could not be. The acromion usually ossifies from two centers which fuse at about the twentieth year, but occasionally they fail to unite and persist throughout life. Vesalius employs a special illustration [*Fabrica* (1543), I, iii: 5] to show these epiphyses. In this drawing there are at least three or four centers, the precise number is difficult to determine, and in the text he says "several," which would be a rather unusual finding. Falloppius [*Obs. anat.*, Boerhaave ed., tom. II, 707] admits of the confusion in Galen but holds that Hippocrates and Galen, as defined by Rufus of Ephesus, all meant by the word acromion, not the bone, but the ligaments of the acromio-clavicular joint or the joint itself.

into the vessel, divide its base transversely from the rest of its body, and then lift away the base from the vessels which emerge from it so as to secure without injury the orifices of the vena arterialis [pulmonary artery] and the great artery [aorta] which you are going to preserve (if you so desire) in the category of the cartilages—attach them to the paper. When therefore the remaining structures found in the thorax have been cast into the vessel, turn the cadaver into the prone position, and clean, as far as possible, the flesh from the rest of the neck, the back and from the entire extent of the thorax, taking the greatest care not to break any of the ribs (inasmuch as they are fragile) nor to damage, by dissecting too closely, any of the processes. These precautions must be even more carefully observed when you proceed presently to free completely the individual ribs from the thoracic vertebrae. //

(p. 157) When the cadaver has been returned to the supine position, proceed to separate the capitulum of the rib from its vertebral sinus with a very sharp scalpel, and then, having gradually divided the ligaments, the ribs must also be freed from the transverse processes of the vertebrae, cleaned forthwith, and placed in the cauldron.

You will handle the legs in the same way which you employed for the arms; cleaning the flesh from the whole of the thigh, next the leg and the entire foot. When you have laid bare the knee, excise the patella from the tendons lying on its anterior aspect, and throw it into the cauldron, as was done with the femur when you freed it from the hip bone and the tibia. Resect the cartilages [menisci] which augment the hollows of the tibia for the reception of the heads [condyles] of the femur, and when convenient fasten them to the paper. Then put the tibia along with the fibula and foot into the cauldron.

Once this has been done for each leg, and the bones attached to the sides of the sacrum [innominate] have been cleaned a little, then the cartilaginous ligaments lying between the vertebral bodies are to be accurately excised and arranged in series on the paper. Therefore when the ligaments which cover the surface of the vertebral bodies have been severed by a very sharp knife, make an incision between the top of the sacrum and the lowest lumbar vertebra; that is the ligament or cartilage which, so it appeared to Galen, divides it from the sacrum. Once again make an incision between the body of the lowest lumbar vertebra and the upper surface of the aforesaid cartilage, and by this means lift out the entire cartilage. When this has been placed on the paper, you will excise the successive cartilages until the second cervical vertebra has been reached. Thus when you have placed in this manner the twenty-three cartilages on

the paper, you must proceed to disjoint the back into three or four parts, but with care and gently, lest by rough handling you should by accident break away any of the vertebral processes. For the same reason one should avoid trying to free the first vertebra from the head carelessly, since one may place the cervical vertebrae together with the head into the cauldron, as indeed one may the thoracic with the lumbar vertebrae, once they have been disunited from the sacrum. However there is nothing to prevent your placing in the cauldron the sacrum together with the bones connected to it (which are formed by the ilia, coxendices [ischia],[4] and pubes), since while still raw they are of course difficult and hard to separate from the sacrum. At this time, if you throw the pubic bones divided into the cauldron, the cartilage of the pubic bones which should on the contrary be preserved intact may also be damaged.

When the bones have been thrown into the cauldron in the manner described, fill it completely with water so that they settle deeply and no bony part rises above the surface. This above all must be observed during the whole period of cooking lest any bone remain uncovered by water and much more so, lest, by projecting from the cauldron it be affected by the smoke. For this reason the cauldron should be capacious. No special technique is employed during the whole cooking, but, as in other elixations, the froth must be carefully skimmed off so as to render the liquid clearer and so that the bones may be drawn out less dirty. For the same reason all fat (which for the most part usually floats on the surface) must be drawn off and placed in some container, for obviously it greatly contributes to the obliteration of markings and attachments of sinews and tendons.

There is no fixed time for concoction since it varies greatly according to age. Two or three hours may be more than enough, especially in cooking the bones of children, as one must try while cleaning them to prevent the appendices [epiphyses] from falling off, the coalition of which in individuals of more advanced years is hardly ever dissolved no matter how much they are cooked. The object of the cooking is to clean the bones

[4] In the Vesalian terminology the *coxendix* is approximately the ischium, except that the entire acetabulum is regarded as being included within the boundaries of this bone. Sometimes, however, Vesalius employs the term, as did many of his contemporaries, as a synonym for the hip-bone, *i. e., os coxa*, to avoid the cumbersome circumlocution, "the bone attached to either side of the sacrum," for the unnamed (innominate) bone of Galen. The term pelvis, or pelvic bone, had not yet come into general use although Vesalius himself was apparently the first to introduce and use the word occasionally in his *Venesection letter* of 1539. Realdus Columbus, his pupil, is often credited with the term because of its employment in his *De re anatomica* (Venice, 1559).

thoroughly as is done with the knife while eating. In order to do this more advantageously, from time to time remove some of the bones from the boiling water with a pair of tongs and clean them separately, unless perchance you have with you a studious companion who may employ his hand at the work. For extreme caution must be taken lest anyone less skilled while scraping damage the ridges, processes, heads and sinuses of the bones, or rashly throw away one or other of the smooth cartilages covering the bones like a crust, for these in particular must be saved when you remove the flesh, ligaments, tendons and membranes surrounding the bones. And I would not for a moment entrust this duty to someone inept and little interested in Anatomy for the foregoing reason only, but in order that you may accurately observe, when you separately clean each individual bone, its sinuses and heads, and particularly the nature of ligaments, the insertion of tendons and the origin of muscles. For I could not easily say how much you are going to be furthered in the recognition of the parts by this work.

Therefore when in this way you have extracted the bones, one by one, from the boiling water, place the cleaned ones on the ground or in a small basket, paying no attention to which first comes to hand. However on withdrawing the hand with the bones of the forearm, take great care not to separate forcibly the wrist from the bones of the forearm, but gently divide the ligaments of the joint with a knife. Carefully free the wrist from the bones of the forearm, and in like manner separate the postbrachial [metacarpals] from the wrist. I would have you take care not to divide the wrist bones from one another, but you should instantly disjoint it in one piece from the forearm and from the first bone of the thumb [metacarpal I] and the postbrachials [metacarpals II-V],[5] otherwise merely removing the tendons and ligaments covering it, and trying not to clean the internal [volar] and external [dorsal] surfaces entirely of ligaments, as the bones of the wrist are held together by their aid. Thus when the wrist is exposed to the fire // (p. 158) and its ligaments gradually dried, its bones are held firmly together, and it may be connected to the forearm and postbrachial [metacarpal] bones with very little difficulty on mounting the skeleton, unless perchance, being more skilled in

[5] Aristotle [*Hist. animal.*, I: xv: 493b] apparently regarded the metacarpus as consisting of five bones, but Galen [*De ossibus*] holds that the first metacarpal belongs to the phalangeal series. Thus began the great polemical controversy on the morphology of the thumb which extends to modern times and still remains unsettled. Vesalius [*Fabrica* (1543), I: xxvi: 120] recognises that there is much to be said for the Aristotelian view but nonetheless decides to follow Galen and therefore consistently refers to four metacarpals.

joining the bones, you were to venture to separate the wrist bones from one another and to clean off the ligaments, and later to unite them with copper wire; or you may wish to keep them separate.

As soon as the wrist has been placed in this manner before the fire, take a paper on which to place the thoroughly cleaned postbrachial and digital bones, not forgetting the sesamoid ossicles. These are wrapped in paper so as not to confuse them with those of the other hand, and thereby increase the labour of uniting the bones. Hence it might be advantageous to wrap the bones of the hands and feet in four separate papers. However make quite sure before folding the bones of one or other hand or foot in paper, that none is left over uncleaned so that when you come to discard the waste and fluid, you do not carelessly include in its ejection some of the bones. If you should perhaps care to preserve one of the nails, avulse it while cleaning the digital bones of the hand or foot, for we observe that human nails like those from the feet of birds and quadrupeds disappear when placed in boiling water.

When cleaning the ulna and radius, do not neglect the cartilage [articular disc] which extends from the radius and in large part separates the ulna from the wrist.

Furthermore, when cleaning the head take the greatest care while tearing away the membrane surrounding the foramen of the auditory organ, not to remove negligently the ossicles[6] which enter into its construction. In fact, after a stylus has been introduced into the foramen, they are to be carefully torn loose and at the same time shaken out. Set aside these ossicles somewhere near the rest of the collection of bones.

[6] Only two of the auditory ossicles, the malleus and incus, were recognised at this time. Gabriel Falloppius [*Obs. anat.*, Boerhaave ed., tom. II, 698] gives the history of the discovery of the stapes. He says that it was Berengarius of Carpi (1470–1550) who first discovered and described the first two, as related in his *Isagogae breves* (Bononiae, 1522) and *Commentaria* (Bononiae, 1521). This account was elaborated by Vesalius who named the two ossicles the *malleolus* and the *incus*. The third ossicle was discovered and named by Joannes Phillipus of Ingrassius (1510–1580) and reported to Falloppius in 1548 by one of his students, a relative of Ingrassius. Falloppius confirmed its presence and says, "And although I have sometimes said that this discovery was my own, and others have claimed it as theirs, nevertheless the glorious God knows that the discoverer was Ingrassius." One of these claimants was Realdus Columbus, who states, "As far as I know, no one was aware of this third ossicle before me" [*De re anat.*, I: vii: 26]; a claim which Falloppius specifically attacks. Vesalius was likewise able to confirm the new finding and also acknowledges Ingrassius as the rightful discoverer [*Examen*, Boerhaave ed., tom. II, 770]. On the other hand, Alexander Achillini (1463–1512) of Bologna has been credited as having first discovered the malleus and incus in 1480 [Haeser, *Lehrbuch d. Gesch. d. Medizin*, II, 24-5], which is denied by Michele Medici [*Compendio storico della scuola anatomica di Bologna* (Bologna, 1857), 51] who says that they were well known long before either Berengarius or Achillini, *cf.*, Lynn Thorndike, *A history of magic and experimental science* (New York, 1941), V, 43 ff.

Finally remove the vertebrae entirely from the broth, as well as the sacrum; unless perchance it is desired to free the coccyx from the sacrum by further boiling, because, that is to say, its ossicles on account of the cartilaginous ligaments which unite them, if cooked too long are wont to separate from one another. If however you have removed the sacrum in order to cut off the coccygeal bones, it must be returned once more to the cauldron and the coccyx placed separately on the paper or thrown into a small basket in which you should place the smaller ossicles such as the teeth, if any have accidently fallen out, or any portion of the bones which has been carelessly broken off.

In order to save the cartilage of the pubic bones, before the ilia are freed from the sacrum the pubes must be cleaned a little on their anterior and posterior aspects and then separated from one another by the hands only, so that the intervening cartilage may pull away from the one and remain attached to the other. Thus later, on assembling the bones, one pubic bone may be joined without difficulty to its opposite.

Once again count up the bones cleaned by this method, with the exception of those of the hands and feet previously wrapped in separate papers. Closely examine the parts of the skull freed from the rest of the head, and see whether the small portions of the temporal bones attached like a scale to those of the vertex, and which are usually removed by the saw from the rest of the temporals, have fallen out as a result of boiling. You should take care not to throw them out accidentally with the waste material of the bones or the broth. As a rule they readily fall away from the bones of the vertex if the saw has been carried by chance much above the ear. Then see whether any of the teeth have fallen from the upper or lower jaws. Now reckon up the twenty-four vertebrae, a similar number of ribs, two clavicles, two scapulae, two humeri, two ulnae and two radii, the sacrum from which the coccyx has been previously removed, two large bones connected to the sides of the sacrum [innominates], two femora, two tibiae, two fibulae, and similarly two patellae.

Once you have accounted for all of them, it is most advisable to immerse the bones once more in clean boiling water and as soon as they are withdrawn to wipe each with a rough, harsh cloth so that the remnants of the ligaments and membranes, or the insertion or origin of the muscles, may be rubbed off and wiped away; care being exercised not to remove at the same time the slippery cartilage attached to the bones like a crust. While these, placed in front of the fire, are being lightly dried, the cartilages of the ears are being cleaned of skin and should be attached with the rest of the cartilages to the paper. The same should be done with the cartilages

of the eyelids and nose, and then while it is still raw the bone resembling a U [hyoid] should be cleaned as thoroughly as possible from the muscles united to it. When this bone has been cleaned, thoroughly free in the same way from the trunk of the rough artery [trachea] the raw cartilages of the larynx from their flesh and membranes, along with one or other of the cartilages, comparable in shape to a C.

Now clean assiduously the pectoral bone and the cartilages connected to it, which is not so easy to accomplish in that it is covered by several membranes, is fatty and meanwhile must not be cooked at all or scarcely even splashed by hot water. Indeed when you strip the cartilages from the flesh, care must be taken not to remove the membrane intimately covering them and corresponding to that which, because it surrounds the bone, is called by the Greeks the περιόστεον [periosteum]. To be sure, after the removal of this membrane the cartilages are more weakly united to the pectoral bone and become contracted, shortened and distorted. The pectoral bone must not be dried before the fire so as not to shrink the cartilages, but must be placed elsewhere, in a not too humid place, until you intend to fasten the bones together, lest the cartilages become more or less withered and should later contribute to the deformation of the bony thorax. // (p. 159). Indeed there is absolutely nothing which will vitiate the elegant structure of the skeleton to such an extent as the pectoral bone and its cartilages, if these matters are carelessly attended to, and if they are allowed to dry out before, and not later with the mounting of the bones. However, the rest of the cartilages placed on the paper may be moved slightly towards the fire but so that they do not shrink too much as it is better that they dry out after mounting.

Now you have the bones in shape for assembly in the manner to be described or, depending on whether you wish them mounted or unmounted, for preservation in the loose state, which is also of great value. For the unmounted bones placed in order in a long box, can be inspected separately at any time and can teach one all those features requisite for a knowledge of them. However when the bones have been mounted and are united, they do not display the sinuses and heads of the bones so precisely, but, to speak the truth, contribute more to display than to instruction.

Bones most useful for learning.

On the other hand, bones pilfered from the Italian tombs constructed like warehouses (as almost all are here) and thus exposed to every rain, or at least to the air, so that in due time these bones receive the rain water, are very suitable for learning. Apart from the fact that such tombs are damp, they continually let in water by means of which all matter attached to the bones macerates very rapidly so that after some years,

they are freed and incidently washed, are left quite intact and exhibit to the observer no difference if placed in series in a box without being connected. However they are utterly useless for the purpose of joining together, not only because of their excessive hardness, but because of the loss of the cartilages of the ribs and of the entire body which, even if found, are friable and separate everywhere from the bones on account of their rottenness. Again those bones which, among other nations, are dug up from the earth and preserved in heaps in the cemeteries are useless for this purpose. For in addition to the fact that they are affected by decay because of the dryness of the earth, you never find all the bones from the same subject as is the case in the aforementioned tombs and even in the Cemetery of the Innocents at Paris,[7] even provided that you have dug up from the earth there as many piles of bones as those which afforded us such an abundant supply when I first studied the bones with Matthaeus Terminus,[8] distinguished physician in all branches of medicine and, as long as I live, the cherished and most learned companion of my studies. Thus, having learned by long and tiring use of observation, we, even blindfolded, had at times dared to wager with our companions, and in the space of half-an-hour, no bone could be offered to us from such great heaps which we could not identify by touch. This had to be done the more zealously by us who desired to learn insofar as there was a greater lack of the assistance of teachers in this part of medicine.

How the cleaned bones must be united.

But again to what concerns the connection and erection of the cooked bones. These, soon after cleaning (lest they become too hard), should be united together. For immediately after cooking the bones may be perforated without difficulty by means of the special awls with which the soles of shoes are sewn, and may be tied together by copper wire. This each will accomplish according to

[7] One of the most ancient burial grounds of Paris, conveniently situated for the avid student of osteology at the university in 1536 was the Cemetery of the Innocents. Here were buried by the hundreds the victims of the plague, but Philip-Augustus, in constructing his famous wall around the city in 1186, had required much of the graveyard. The disinterred bones were therefore removed and placed in a series of specially constructed charnel houses, the position of which corresponds to the Rue des Innocents of the present day. These charnel houses saw service for centuries, but almost nothing now remains except for a skeleton sculptured in marble, called *La Mort-Saint Innocent* and housed in the Louvre. It once formed a part of the decorative motive, and Vesalius may well have contemplated it when learning to identify the bones by touch alone. In the center of the cemetery stood an octagonal tower known as Notre Dame des Bois and on the north side the church of St. Innocent, but the celebrated fountain of Pierre Lescot and Jean Goujon had still to be constructed. Cf. A. Franklin, *Étude sur le plan de Paris de 1540* (Paris, 1896), 234.

[8] We have been unable to identify Matthaeus Terminus, the notable physician, with whom Vesalius apparently stayed while studying in Paris.

his own inherent manual dexterity and by his own exertions, if he has not observed the instructions which we have so far described in the whole of this book. First of all, several awls and some copper wire, part thick and part thin, are made ready. The wire may be placed in the fire so that presently being more ductile, it may be variously and freely twisted without breaking. Two tenaculae or forceps are added to these, one for twisting the wire, and the other for cutting after it has been twisted.

Instruments of this sort are displayed almost *seriatim* in the table, chap. 7, book 2, at the characters S, T, V, X, Y.

ANATOMICORVM INSTRVMEN-
TORVM DELINEATIO.

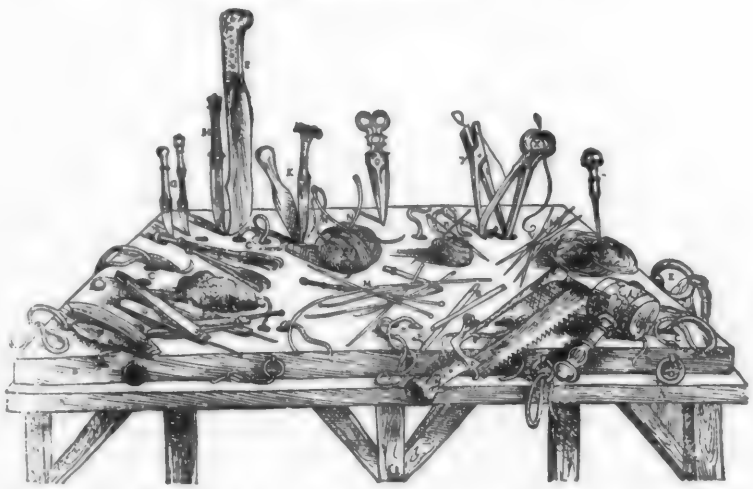


FIG. I. The illustration of dissecting instruments taken from chap. vii, Book II, referred to in the text.

Begin by wiring together the bones of the feet. First join the talus to the calcaneum, then the cube-like bone to the calcaneum, the bone resembling a skiff [navicular] to the talus, and the three inner bones of the tarsus [cuneiforms][9] to that resembling a skiff. Next join to the last

[9] The tarsus of the Vesalian terminology comprises the three cuneiforms and the cuboid only. This restriction of the term was to cause endless confusion. The Greek word "tarsos" means literally any broad or flat surface and hence was applied to the flat of the foot or hand, and may designate either the tarsus or carpus of modern terminologies. Galen uses the word sometimes to mean the entire proximal portion of the foot including the soft parts, and sometimes for the distal row of tarsal bones only. Thus in the *De*

mentioned, the metatarsals (*ossa pedii*)[10] and to these in series the digital bones with the ossicles resembling the sesame seed which, because they are very hard and solid, you will perforate very carefully with a thinner awl as they are very easily split and divided by its force.

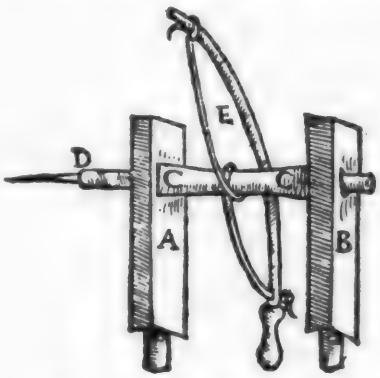
When you have completed the joining of each foot, the tuber [intercondylar eminence] of the tibia which separates the sinuses receiving the femoral heads [condyles] must be perforated by a longish but curved knife to provide for the reception of a harder rod which is thrust into the femur like a peg, thus uniting the tibia to the femur as we observe beams to be joined without glue. So another foramen must be provided in the inferior aspect of the femur, agreeing in line with that which I wished to be made in the tibia, so that the same rod may be inserted into both femur and tibia, and by this means the knee joint may remain unbent. However in addition to the rod, the femur should be united to the tibia on either side by a thicker wire, not forgetting the cartilages which increase the size of the tibial sinuses. These cartilages, when the bones are united and at the same time strengthened by them, will be preserved in the knee

ossibus [xxiv] Galen observes, "After these four bones [cuneiforms and cuboid], the first part of the foot which they call the tarsus terminates," so that it is not clear whether he means the entire tarsus or only the distal row. However, in the *De usu partium* [III: viii] he remarks, "After these bones [calcaneum, talus and navicular] come those of the tarsus . . . The tarsus is composed of four bones, while the number is double for the carpus which is observed to be composed of two rows." But in the second commentary on Hippocrates' *De fracturis* [xviii], having accurately described the proximal row, he goes on to say that there are eight tarsal bones. This apparent error puzzled Adams [*The genuine works of Hippocrates*, II, 44], but a similar statement is found in Rufus of Ephesus [Daremberg ed., 193] and echoed by Celsus [*De medicina*, VIII: i]. The confusion was due as mentioned above to the use of the word in several ways. Tarsus alone signifies the flat of the foot including soft parts; the bones of the tarsus, the distal row (although the word bones is sometimes left out where the context demands it); and, as the proximal row was always described in detail and as separate bones, no homologies being drawn with the carpus, the distal row, collectively called tarsus, was dismissed as numbering eight, i. e., of both feet. By the end of the sixteenth century the use of the term to cover the entire tarsus was common.

[10] From their fancied resemblance to a series of ribs, Hippocrates [*De artic.*, iii: 222, 228, Kühn ed.] had called the metatarsal region στῆθος. On the other hand, Galen [*De ossibus*, xxv] uses the term πέδιον, i. e., "the flat" of the foot. These terms had been variously rendered into Latin as *pecten*, *planta* or *vestigium*. Vesalius remarks [*Fabrica* (1543), I: xxxiii: 150 for 148] that these words cause confusion and therefore usually adopts the term *ossa pedii*, "the bones of the instep," specifically for metatarsals. The term metatarsal itself, unlike the word metacarpal, was not used by the early Greek writers on anatomy, but, according to Hyrtl [*Onomatologia anatomica* (Wien, 1880), 529] was first introduced by Andreas Laurentius in his *Historia anatomica humani corporis* (Paris, 1589), II: xxxvii. However, we find several other anatomists about this time, such as Caspar Bauhin [*Institutiones anatomicae* (Basileae, 1609)], also adopting the word metatarsal. Cf. Julius Pollux, *Onomasticon*, II, sect. 93.

joint. Then the fibula is wired to the tibia above and below, and the patella secured to the femur and tibia at the same time. Once this has been done in each leg, the iliac bones must be attached to the sides of the sacrum by a thicker wire, and then the pubic bones ought also to be united to their intervening cartilage.

Now there will be at hand a circular board on which the bones are to be erected. It will be convenient for the circumference of this board to be of such size that the feet can be suitably supported in whatever place



Hac figura inſtrumentum id expreſsimus, quo duriora oſſa leui negotio perforantur. Significẽt itaq; A & B duos ſtipites, qui menſæ aut ſcamni alicuius angulo poſſunt infigi. C, C axim. D axis partem, cui ferrum, ſubulæ in modum inditur. E uerò arcuulum, quo axis circũuoluitur.

FIG. II. An illustration of the bone drill devised by Vesalius to facilitate articulation of the bones, added to the revision of this chapter in the second edition of the *Fabrica*, 1555.

you have decided the bones are going to be set up. In the middle of this board a hole is prepared so that when you stow away the bones in an upright box, the bottom of the box may have an axle which when set in this hole, permits the disc to be turned around. In addition to this hole, another is established near the circumference of the disc into which a piece of wood fashioned like a javelin, a spear or a scythe (or whatever appeals to you), can be fixed and which the hand of the skeleton may support. //[11]

[11] Vesalius' fanciful conceit of decorating the articulated skeleton with a spear, a scythe or some such symbolic object is exemplified in the famous frontispiece of the *Fabrica* of 1543, where the skeleton is shown grasping a staff, often mistaken for a trident because of the illusion created by the ribbons of the cartouche, and in the 1555 edition where a scythe is substituted; and again in the anterior view of the skeleton in the first book, the arm rests upon a spade. It is obvious that some such arrangement is responsible for the curious pose of the skeletal figures of the *Tabulae sex* of 1538 where the right hand doubtless held a staff. It would seem that the practice had some influence in suggesting

(p. 160) Place the feet on the disc constructed in this manner, and, with the aid of an assistant, attend to the support of the rest of the bones of the legs above the feet, and then place the femoral heads in the acetabula of the hip-bone (*ossa coxendica*) so that you may measure exactly with a wire or a small rod the interval extending from the disc to the lower aspect of the foramen engraved in the sacrum for the sake of the spinal medulla. This distance will indicate to what measurement an iron rod must be fashioned which, when fastened to the disc and inserted into the foramina of the sacrum and of the rest of the vertebrae transmitting the spinal medulla, will nicely support all of the bones.

The iron rod must be so prepared that it may be strongly fixed by bolts to the middle of the disc and so that it is round or quadrilateral all the way from the disc to the recently mentioned foramen. But above this level it should be wider than thick so that later it can be bent to the curve of the back and be so adapted to the vertebrae that being immobilised they may not be turned around on it. And so the iron rod is first made thinner as far as the point where the sacrum is supported in order that it may not slip downward. For if this bone is not fixed and supported, the rest of the vertebrae as well as the sacrum will gradually sink down and eventually the legs of the skeleton will be inclined at an unsightly angle. Consequently the distance from the disc to the lower aspect of the sacral foramen must be accurately measured. The same degree of care does not have to be taken with the length of the iron rod, for if it be perchance too long, it may be easily cut off after putting the bones together. If it is decided to keep the bones in a box, it is a great advantage to make the iron rod approximately two palms length longer than the whole skeleton, so that the portion of the rod projecting beyond the vertex, can be placed in a hole in the upper end of the box and can be turned about in it.

Whenever the iron rod has been fastened perpendicularly to the disc, gradually carve out with a very sharp knife the foramen cutting through the sacrum on account of the dorsal medulla, so that the iron can be conveniently thrust into it. Since this foramen is by nature highly curved and markedly oblique, it will not admit the iron rod at all unless enlarged in the manner described to allow one to push the sacrum from the tip of the iron rod all the way down to that level which, we shall indicate no further, is round or quadrilateral. If perchance it seems that the sacrum

the dynamic representation of the figures which has been so greatly admired in the *Fabrica*, and a transition from the simple pose of the earlier illustrations to the magnificent beauty of the later is clearly discernible.

will not be conveniently supported at this level, it is an advantage to roughen the iron at this site with a file and then to wrap around it a knot of copper wire to support the sacrum favourably.

When the sacrum has been propped in this manner, connect the femoral heads to the acetabula of the hip-bone with a thicker wire, paying careful attention to what extent they are rotated outwards or inwards, so as not accidently to unite the legs in an unsightly manner or so that the patellae face the interior of the legs rather than the exterior; which would be the case unless you join the heads to their sinuses exactly. However you do it, the wire used for this connection must not be completely twisted up before you have united the feet to the disc and to the tibiae in that position which will appear to you the more elegant. Endeavour to obtain this elegance most especially from the staff by which the pose of the arm will be maintained, whether it be a reaper's scythe, a javelin, a spear, Neptune's trident, or whatever instrument is appropriate.

Now all the vertebrae must be arranged in series so that you may observe no difficulty in finding the position and order of each, which is readily shown by the shape of the vertebrae and the manner of their articulation. Therefore, when you have first placed them all in order on a table, unite the five lumbar vertebrae by two connections which have been made at the sides of the bodies and which, at the same time, hold in position the cartilaginous ligament previously said to lie between the vertebral bodies. The ligaments of this sort are to be taken in order from the paper to which they are applied, but always leaving behind those which separate the vertebrae, not yet to be wired together—just as for the time being, the ligament or cartilage intervening between the sacrum and the lowest of the lumbar vertebrae and that which lies between the uppermost lumbar and the lowest thoracic.

When the lumbar vertebrae have been united, the lower six thoracic are connected and afterwards the upper six with the lower cervical. The remaining cervical do not have to be wired together, but the intervening cartilage is merely to be glued to the inferior surface of the vertebral body since the cervical vertebrae are held in position, not by being bound together but only by the iron rod thrust through them, and are not immobilised like the thoracic vertebrae which must later support the ribs.

Immediately you have united the vertebrae by the method advised and before pushing the iron rod through them, lay the lumbar vertebrae so connected on it and carefully bend it to their arrangement or curve, and then unite the lowest vertebra to the sacrum as you previously connected the lumbar vertebrae to one another. Now join the thoracic to these,

constantly bending the iron very accurately as needed, or is necessary, and then wire the lowest thoracic to the highest lumbar vertebra.

The upper thoracic are added to these in the same way, and when the lowest of these has been wired to the highest of those already on the iron rod, fashion a flattish long rod, painted black, which is fastened to the posterior part of the iron or, as you think fit, is introduced downwards between the iron and the vertebrae, so that by its aid the vertebrae may be held more firmly to the iron and may not be moved in any way lest the whole thorax should later be twisted to one or the other side in an unsightly manner.

In order to attach the skull to the iron rod it is necessary to perforate its vertex by an opening corresponding exactly in size and thickness to the rod. To prevent the skull from being turned in every direction by any cause once the iron has been thrust through it, and, depending on whether you wish the face to look straight forward or to the sides, // (p. 161) the opening should be carved out with a knife either transversely or obliquely. Likewise the skull must once more be perforated at the level at which its section was carried out with the saw, so that it may be united by small ties and whenever one desires, after the skull has been removed from the iron rod, it can again be disunited, for it is of the greatest importance to inspect the internal cavity of the skull in which the brain is contained. In order to do this both parts of the skull must be perforated with a hot iron or the point of a knife by three holes in mutual correspondence to one another. One may conveniently be made in the occiput and one in each of the temples.

Unite the lower jaw to the upper with copper wire; the connection being made to the sinuses of the upper jaw by the heads of the mandible. But when the connection is not sufficient to bring the teeth in accurate apposition, and the lower jaw hangs open, to be more elegant, in addition to the aforementioned connection, the sharp processes [coronoid] of the mandible must also be perforated and a string tied to them, which, threaded under the zygomatic arches and resting upon the vertex, can be pulled either towards the forehead or towards the occiput, thus opening or closing the jaw, and so the teeth can be placed in occlusion.

However it may be, the greatest care ought to be given to the iron rod to see that it is not bent unsuitably backwards or forwards and supports the body unbecomingly. To avoid this, it is most important to understand the alignment of the back.

Now is the time to wire the ribs to the vertebrae and to their cartilages. To do this accurately and carefully, first separate all the right ribs from

the left, which will be inferred or assumed from the sinus by which the vein, nerve and artery are extended to the rib and from the superior regions of the ribs which are thicker than the inferior. Then somewhat in the following manner ((( ))), place the ribs in series on a table so that the right correspond in order to the left. It will be easy to place each of the ribs in position if those features for distinguishing between them, which we mentioned above, have not slipped from your mind.

Out of the series of ribs connect the first rib of either side to the pectoral bone by its cartilage, and then lift up the pectoral bone with its cartilages, holding it in position by its mate, and wire the first ribs to the transverse processes of the first thoracic vertebra. In addition unite the second ribs to their vertebra and later to their cartilages, and so all in succession, observing, however, that you allow the ribs to flare out by exactly the same interval which mutually separated them from their cartilages before dissection.

Now join the humeri to the scapulae by a thicker wire, and the clavicles to the acromion by a thinner, and anon the scapulae to the ribs and the clavicles to the pectoral bone. However when you bind the humeri to the scapulae, estimate carefully the position in which you place the attachment of the arms. The manner in which the humeral head is united to the sinus of the scapula is of great importance. In this connection the cartilage, with the aid of which the scapular sinus is increased, must by no means be forgotten, nor will one neglect the cartilages peculiar to the mandibular and clavicular joints and which will be fastened to their respective joints.

Furthermore, the bones of the forearm must not be attached to the humerus until the whole hand has been joined; and so the radius must be bound to the ulna above and below. If the bones of the wrist have been disarticulated and freed from their ligaments, they must be united to one another. Otherwise they are adequately held together through the mediation of their ligaments. Connect the first bone of the thumb [metacarpal I] and the four metacarpals to the inferior aspect of the wrist and then to these, the bones of the fingers along with the sesamoid ossicles. Finally join the wrist to the radius and then the ulna to the humerus. When this has been done for each of the arms, tie the hands to the staff which I said was to be erected in the form of a scythe or otherwise and firmly implanted in the disc.

Now that the bones have been erected, one can fashion a necklace from the bone like an U [hyoid], the ossicles of the auditory organ, and the cartilages of the trachea, the ears, the eyelids, the nails and the heart,

all of which you may attach to a chain or to a dried nerve from the leg or arm.

When, because of the tumult of war, I returned from Paris to Louvain[12] with Gemma Frisius,[13] celebrated both as Physician and Mathematician and equalled by few, while out walking looking for bones in that place where on the country highways eventually, to the great convenience of students, all those who have been executed are wont to be placed, I happened upon a dried cadaver which was similar to that of the robber whom Galen mentions[14] he had seen. I suppose, just as the birds had freed the latter of its flesh, so they had cleaned the former, because in the previous year it had been burnt by straw and partially roasted, and then tied to a stake. It thus presented a choice morsel to the birds. Consequently the bones were entirely bare, held together by the ligaments alone, and only the origin and insertion of the muscles were preserved. In those who are hanged nothing of any value remains since, except for the eyes (even if it is commonly thought otherwise), the vultures tear off nothing because of the thickness of the skin. As the skin remains intact, the bones within undergo decay and are quite useless for instruction. And so observing the body to be dry and no part of it moist or rotten, I did not at all neglect this unexpected and forthwith personally desirable opportunity. Indeed with the help of

Book I, *de Adminst. dissect.*

[12] Vesalius returned to Louvain from his studies in Paris because of the outbreak of the third Franco-Germanic war of 1536. The return is also mentioned in his preface to the *Fabrica* (1543), *3 recto.

[13] Regnier Gemma, commonly called Frisius, notable mathematician, astronomer and physician, was born in 1508 at Dockum in Frisia. His literary education begun at Groningen, was completed at Louvain where he commenced the study of medicine and thus became associated with Vesalius. He received his doctorate in 1542 but achieved greater distinction as an astronomer and mathematician. He was consulted by Charles V on a number of occasions, refusing however, an offer of attachment to the imperial court. He died at Louvain in 1555. He was author of numerous mathematical, geographical and astronomical treatises published between 1529 and 1556. *Nieuw Nederlandsch biografisch woordenboek*, VI (Leiden, 1924), 556-7.

[14] Galen's mention of having seen by the wayside the dried cadaver of a robber, was an episode of great moment to Vesalius as this was one of the only occasions on which Galen specifically states that he had viewed human remains. Vesalius discusses the episode many times in his writings. The circumstances are given by Galen in his *De anatomicis administrationibus*, Lib. I [*Opera omnia*, Froben ed., Basileae, 1542, tom. I, col. 211]: "Also I once saw lying on a hill near a road the dried cadaver of a robber, killed by a traveler who struck him down before he could be assaulted. But no inhabitant of that region was willing to undertake his burial, so as to satisfy their vengeance and rejoice in his being devoured by vultures. These, after two days when the flesh had been stripped away, thus left that dried cadaver for anyone to inspect who might be desirous of learning very accurately the positions of the joints."

Gemma, I climbed the stake // (p. 162) and pulled off the femur from the hip-bone (*coxendi*). On my hauling, the scapulae together with the arms and hands also followed, although the fingers of one hand and both patellae along with one foot, were missing. When I had brought the legs and arms home in secret and successive trips, (leaving the head behind with the trunk of the entire body), I allowed myself to be shut out of the city in the evening in order to obtain the thorax which was firmly held by a chain. I was burning with so great a desire and eagerness to possess those bones that I climbed the stake and with no little effort and industry and without witnesses, was not afraid to snatch in the middle of the night and in that multitude of corpses, what I so longed for. Having pulled down the bones, I carried them some distance away and hid them in a secret place and the next day transported them home piece-meal through another gate of the city. However when I began to cut the ligaments, I accomplished nothing because of their extraordinary hardness, and so I attempted to soften them in boiling water. Thus I finally cooked all the bones secretly to render them more suitable for my purpose and when clean, constructed that skeleton which is preserved at Louvain in the home of my very dear old friend Gisbertus Carbo,[15] of distinguished training as a physician and in various branches of learning and my companion in studies from boyhood.

I prepared this skeleton with such great haste, obtaining elsewhere with no little effort and industry the hand and foot and the two patellae, that I convinced everyone that I had brought it from Paris, in order to destroy all suspicion of having made off with the bones. Although later, the Burgomaster so favoured the studies of the candidates of medicine that he was pleased to grant whatever body was sought from him, and he himself attained no common knowledge of anatomy and was in regular attendance when I was administering an Anatomy there.

Inasmuch as our labours were so successful on the first attempt, what will be the result now that we have also described for others the method of mounting, and, apart from the present subjoined illustrations, are not skeletons, as well as our work, to be seen in several academies? Not only the bones of man, but on Galen's account those of apes[16] and dogs, and

[15] Gisbertus Carbo of Louvain has not been identified.

[16] During the winter of 1539–40, Vesalius articulated for comparative purposes the skeletons of an ape and of a man. These preparations were to be used in connection with his course in anatomy to be given in that year at the Academy of the city of Bologna. He was assisted in this task by his very good friend, Joannes Andreas Albius, Professor of Hippocratic medicine at this university. It was while articulating the simian specimen

for the sake of Aristotle, of birds, fish and reptiles, either articulated or at least disarticulated, should be available for the study of medicine and natural philosophy, unless perhaps we are to regard this branch of philosophy as of no concern to us, and are to convince ourselves that it is sufficient if we can impose on mortals and fill coffins with our syrups and without Anatomy.

that Vesalius first noticed the anapophyses or accessory processes of the lumbar vertebrae which are so prominent in these animals. These processes had been previously described by Galen [*De usu partium*, XIII: ii; *De ossibus*, x]. As these structures are inconsequential tubercles in man, their discovery in the ape and later in the dog, confirmed Vesalius' conviction of what he was pleased to call "the imposture of the Greek" [*Fabrica* (1543), I: xvii: 78-9, fig., p. 77].

THE ORIGIN OF *FREEMARTIN*

THOMAS R. FORBES

The great majority of the biological terms in the English language had their origin in Greek and Latin. However, some technical words employed by the biologist entered his vocabulary from non-classical sources. *Freemartin* almost certainly belongs in the latter category, although the etymology of *freemartin* has never been fully established. The writer's search in available reference works for clues to the origin of the expression disclosed a good deal of scattered but interesting information; this is set forth here, together with one or two new suggestions.

The author is indebted to Dr. Owsei Temkin of the Institute of the History of Medicine for generous advice and assistance.

* * * * * * *

The freemartin, result of a developmental accident, is of particular interest to the embryologist and endocrinologist. Lillie (1) and others have supplied the modern explanation of the phenomenon. Infrequently, a cow has male and female twins.[1] Still less frequently, the fetal blood vessels of such twins undergo early secondary fusion so that the two share a common blood supply during their intra-uterine life. According to Lillie, the testes of the male partner begin pouring male hormone into the blood stream at such an early stage that the developing reproductive system of the female twin is profoundly affected. She is then known as a freemartin. Her ovaries have been modified into testes, and she has developed male sex ducts. She is sterile. However, since her mammary glands and external genitalia are almost always of the female type, her transformation is by no means complete. Her size and contour differ from those of the cow.

The sterility of the freemartin, a matter of importance to the farmer, has been recognized for centuries. Indeed, John Hunter, who first published (2) an analysis of the phenomenon,[2] points out that

> The Romans called the bull, taurus; they however, talked of taurae in the feminine gender. And Stephens observes, that it was thought the Romans meant

[1] The condition also has been described in pigs, and may occur in other forms as well.

[2] In a letter of April 5, 1810, from Edward Jenner, student of Hunter, Jenner states that he was the first ("some thirty years ago") to make the freemartin condition known to Hunter (3).

by taurae, barren cows, and called them by this name because they did not conceive. He also quotes a passage from Columella, lib. vi. cap. 22, "and like the taurae, which occupy the place of fertile cows, should be rejected, or sent away." He likewise quotes Varro,[3] De Re Rustica, lib. ii. cap. 5, "The cow which is barren is called taura." From which we may reasonably conjecture that the Romans had not the idea of the circumstances of their production.[4]

Harper's Latin Dictionary (5) defines *taura* as "a barren, hybrid cow, a free-martin," and Georges' dictionary (6) gives for *taura*, "eine unfruchtbare Zwitterkuh." Scientific analysis of the freemartin condition was of course relatively recent, and one can only, like Hunter, speculate as to just what was the significance to the Romans of the term *taura*. Since *taurus* is the usual Latin word for bull, *taura*, or "female bull," seems to imply a recognition of some of the masculine characteristics of the freemartin. The passages cited by Hunter from Varro and Columella distinguish taurae on the basis of their sterility, but Festus (7) suggested that the term is applied to sterile cows because they no more bear young than do bulls; he also calls attention to the similarity of *taura* and the Greek ταύρα.[5]

Freemartin as applied to cattle was a term in use by 1681 (8); Lisle's *Husbandry* (1722) (8) speaks of freemartin sheep. Bewick's *History of Quadrupeds* (9) comments that the freemartin is well known to farmers. It is of course probable that the term was popularly employed long before it was used in print. The phrases *free martin-heifer*, *martin-calf*, and *martin-heifer* have also appeared.

The problem of the derivation of *freemartin* (also *free martin*, *free-martin*) is a dual one. The word *martin*, as far as available records indicate, seems to have been used by itself before the combined term was employed. In England and Scotland martin was also written *marten*, *mart*, *maert*, *mairt*, *mert*, *marte*, *marti*, and *martir*. Palmer (10) quotes from the ancient romance of *Sir Tristem* (circa 1220) to illustrate the use of *martir*. Jamieson (11) cites the following passage from the Acts of James IV in 1489:

> . . . That all — *martis*, muttoun, poultrie — that war in the handis of his Progenitoaris and Father — cum to our Souerane Lord, to the honorabill sustentation of his hous and nobil estate.

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[3] Died 28 B. C.

[4] A portion of Hunter's article, including the footnote quoted above, was reproduced for popular consumption in *The Gentleman's Magazine* for January, 1780 (4).

[5] "Tauras vaccas steriles *appellabant, ait Verrius*, quae non magis pariant *quam tauri: sed vero* similius sit ex Graeco *dictas, quia Graeci vaccas* ταύρας appellant."

Mart had appeared in a document by 1307 (8); *martin*, by 1593 (3). *Martin* and its variants had somewhat different meanings in different localities; the words are defined in several ways. The basic meaning was cow, or ox, or spayed heifer (3, 8, 10, 11, 12, 13, 14, 15, 16). Often the terms applied to cattle killed for food on or close to Martinmas or to the beef itself. It was customary to butcher cattle at the time of this festival (November 11) so that the meat could be dried, salted, or smoked for winter provisions. Hart (17) suggests that non-breeding animals, including the freemartin, were undoubtedly selected for slaughter. Frequently it has been suggested that *martin* is derived from St. Martin's name or from his day, but there seems to be no real proof that the similarity is more than coincidental.

Palmer (10) points out that the Modern Greek term *marti* signifies a sheep fattened for the festival of San Martino.

It has also been suggested that one might speculate, again without real evidence, that the Scottish *martyr* (also *marter, martire, mertir*), to hew down or butcher (10), is related to the Anglo-Saxon word *martyr* (from the Greek and Latin *martyr*, a witness), as used to denote an individual put to death for professing Christianity.

Mart in Gaelic and Irish means cow, heifer, ox, cow for slaughter, or beef (8, 10, 11, 12, 13, 18). According to *Webster's Dictionary* (13) and the *New English Dictionary* (8), *mart* in early Irish law referred to an annual levy of cattle, "apparently imposed at will." Jamieson (11) believes that *mart* is not an original Gaelic word but that it has been borrowed for specific use.

The evidence for the possible origins of *martin* and its variants was reviewed in some detail in 1910 by Ballantyne (16).[6] His article is perhaps the most comprehensive on the etymology of *freemartin*. However, although his evidence indicated that the term refers to a female, he was influenced by a recently published study by Hart (19) in which the latter emphasized that the freemartin is a genetic male. Hart's conclusion was based largely on his interpretation of the gonads as true testes and of the internal accessory sex structures as masculine organs, as well as on his belief that the freemartin is a monozygotic twin of its normal male partner. Lillie (1) subsequently showed convincingly that the freemartin is a genetic female.

Information regarding the origin of the prefix *free-* in freemartin is

[6] This article is signed simply "J. W. B." However, the author refers to another article (*Brit. Med. Jour.*, *i*, 780-781, 1900) to which his name is signed in full.

less direct than that for *martin*. A search of pertinent literature and reference works indicates (3, 8, 10, 11, 12, 13, 14, 16, 17, 20, 21, 22, 23, 24, 25) three possible derivations, although only two of them have thus far been suggested.

The English, and particularly the Scottish, nouns and adjectives *farrow*, *ferow*, *ferrow*, *furrow*, *farra*, *ferra*, *ferry*, and *ferry cow* refer variously to a cow that is not with calf, to a barren cow, or to a cow that is not giving milk. Comparable terms from other languages are: German *Färse*, Middle Low German and Middle High German *verse*, Dutch *vaars* or *vaarkoe*, and Danish *vaars*, all meaning cow or heifer; Flemish *verrekoe*, *varwekoe*, or *verweko*, a barren cow; West Friesian and Westphalian *fear*, barren, not giving milk, Belgian *vare koe* and Gaelic *fearra*, a cow that is not giving milk. The *New English Dictionary* (8) cites Kilian's opinion that the Flemish *verrekoe* is equivalent to *taura*, both words referring to a cow that no longer can produce offspring. It may be assumed that a term signifying a barren cow also implies a cow that does not give milk.

Farrow, an adjective to designate a cow that is not with calf or that is barren, was in use in Scotland by 1494.[7] Jamieson (11), speaking of *ferry cow*, says:

> I suspect that the phrase is radically the same with Belg. *vare koe*, a cow that yields no more milk. For although it seems to signify the very reverse, perhaps the original idea was, that a cow, that did not carry, would by degrees lose her milk entirely.

On the basis of the above terms signifying either (a) simply a cow or heifer or (b) an animal that is not carrying out its normal and desirable functions of reproduction and lactation, it has several times been suggested that "*free-*," as used to designate that type of *martin* which can produce neither offspring nor milk, may be a contraction of the Scottish *ferry*, *farrow*, etc. (3, 10, 16, 17).

A second hypothesis suggested by Jamieson, is that the Scottish *ferow*, not carrying a calf, is related to the Anglo-Saxon *faer*, empty, void, a reference to the barrenness of the freemartin. *Free-*, in turn, might be a contraction of *ferow*.

The author wishes to suggest a third possibility, that *free-* may have its origin in one or more of the words which, in various languages, signify bull or ox. Thus, in addition to the Anglo-Saxon *fearr* or *fear*, a bull,

[7] This word, incidentally, is not to be confused with *farrow*, young pig, litter of pigs, etc., derived from the Anglo-Saxon *fearh* (14).

there are the German *Farre,* Icelandic *farri,* Dutch *var* or *varre,* Old Friesian *fēring,* Middle Low German and Middle High German *var* or *varre,* and Old High German *farr,* all meaning bull or ox (14, 21, 22, 23, 26). On this basis, the hypothesis is offered that *freemartin* may have signified an ox-like or bull-like cow, just as *taura* may have indicated "female bull." If *freemartin* and *taura* indeed had such meanings, then it is of course necessary to assume that at the times these terms came into use cattle raisers recognized that such animals possessed some essential sexual characteristics of both sexes. This assumption seems not unwarranted.

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MORE ABOUT DANIEL DRAKE'S ATTEMPT TO OBTAIN AN HONORARY DEGREE FOR DR. WILLIAM H. RICHARDSON

ESTELLE BRODMAN

In a previous communication,[1] the successful maneuvers of Daniel Drake to get an honorary M. D. from the College of Physicians and Surgeons in New York for a colleague on the Transylvania University Medical Faculty, Dr. William H. Richardson, were discussed. It was pointed out then that although Dr. Richardson had been appointed Professor of Obstetrics and the Diseases of Women and Children, two other members of the faculty of Transylvania University Medical School, Dr. Benjamin W. Dudley, professor of anatomy and surgery and Dr. James Overton, professor of the theory and practice of medicine, had objected to Professor Richardson's appointment on the grounds that he lacked a medical degree. On Dec. 31, 1817 Drake wrote to David Hosack at the College of Physicians and Surgeons in New York suggesting that the New York institution solve the problem by conferring an honorary degree on Richardson. This the College did on April 6, 1819, having previously (March 17 and 18, 1819) suggested Dr. Richardson's name to the Regents of the University of the State of New York in Albany for that honor.

In the earlier article it was stated that the cause for the delay of approximately fourteen months between the receipt of the Drake letter and the action by the College of Physicians and Surgeons was unknown. Recently, in going over the John W. Francis papers in the Manuscript Room of the New York Public Library, the answer to this problem was uncovered. A letter by John W. Francis, as Registrar of the College of Physicians and Surgeons,[2] to Daniel Drake, dated Feb. 8, 1818, states:

[1] Brodman, E. An unpublished letter of Daniel Drake to the College of Physicians and Surgeons in New York. *Bull. Hist. Med.* 18: 338-343, October, 1945.

[2] John Wakefield Francis, 1789–1861, the son of an immigrant, was born in New York City, attended Columbia College and the College of Physicians and Surgeons of the University of the State of New York, from which place he received his medical degree in 1811. During the years 1809–1811 he was a private pupil of David Hosack; after graduation he became Hosack's partner and co-editor with him of the *Medical and Philosophical Register* (4v., 1810–1814). He was appointed Lecturer in materia medica at the College of Physicians and Surgeons in 1813. In 1817 he added forensic medicine to his lectureship and in 1819, obstetrics. He was Registrar of the College until 1826, when,

New York, Feb. 8th 1818

Dear Sir,

Your letter to Dr. Hosack came duly to hand and was by him communicated to our Board of Trustees of the College of Physicians and Surgeons of the University of New York. After having considered its nature and objects I have been duly authorized by the Board as Registrar of the College to state to you the Regulations of the School in reference to the conferring of degrees. The Liberality of the College cannot be questioned and the provisions of the Charter evince the generosity of its founders and patrons. The degree of Doct. of Med. may be conferred on any gentle-man competent to the honour; the College only demanding *qualifications*. The Candidate may have studied many years or otherwise, have attended many lectures or none, been the student of this or of that University — these are points of no consideration: is he prepared for the examination before the Board? — if so, after successful application, he can demand a degree. This, Sir, is the spirit of the Charter. As to the particular case of Dr. Richardson there can be no doubt as to his competency to the honour of our Medical School. The consideration in which he is held by those who best know him and his rank in your University can leave no doubt in the minds of our trustees. The only difficulty then, is the absence of Profr. Richardson; it is requisite that he appear before the Board. This may, by some, be deemed matter of form; but so says the Charter and I am directed by the College to state it must be adhered to.

"It shall be the duty (says the Charter) of the President, and professors of the University for the College of Phy^{s}. & Surg^{s}. at any ordinary meeting appointed for that express purpose and of which meetings the Trustees of the said College shall have notice and may attend to examine *all* candidates for the degree of Doctor of medicine and the Regents do hereby give and grant to the said College that they will take into consideration the propriety of granting Diplomas for conferring the degree of Doctor of medicine upon such students as shall be so recommended and to *none other of the students of the said College*." To constitute a student it is only requisite that he enrol his name in the *College Album*.

There seems to be but one opinion with our Board. Profr. Richardson might make a tour after his College labours of the season are over. An examination could be held and Profr. R. be recommended for the Doctorate to the Hon. the Regents

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with the majority of the faculty, he resigned from the College of Physicians and Surgeons and established the short-lived Rutgers Medical College. He retired from teaching when this venture failed.

Francis was interested in many charitable and scientific societies, being one of the founders of the New York Academy of Medicine, and an officer of the New York Historical Society, lending money to James Marion Sims to establish the Woman's Hospital of New York, and helping in the establishment of the State Inebriate Asylum at Binghamton, New York.

Biographical information about Dr. Francis can be found in: *The dictionary of American biography*, v. 6, 1931, p. 580; Mott, V., *Eulogy on the late John W. Francis*, New York, Wood, 1861; Kelly, H. A. and Burrage, W. L., *American medical biographies*, Baltimore, Norman Remington, 1920, p. 408; and Walsh, J. J., *History of medicine in New York*, New York, National Americana Society, 1919, v. 4, p. 6.

which would be conferred by that Body at the following year. This is the course we should be happy if Dr. R. would be able to adopt.

Dr. Hosack asks me to transmit to you the consideration of his esteem and regard.

With due respect I am Sir
Your Obt. Sevt.

J. W. Francis

Dan[l] Drake M. D.
Profr. of Mat. Med. & Bot.
at Transylvania Univy.
Lexington, Kentucky

Evidently Richardson was unable for some time to avail himself of the opportunity to come east to New York and be "examined" by the faculty of the College of Physicians and Surgeons, for his name does not appear in the list of people upon whom the College conferred degrees in the Spring of either 1817 or 1818. He may have appeared in New York sometime between the termination of the Transylvania School year in the spring of 1818, and the commencement of the succeeding school year in the fall of 1818. If this be true, the first opportunity of the Faculty of the College of Physicians and Surgeons in New York to certify his name to the Regents would be the spring of 1819. It would be interesting to have Richardson's own correspondence on this matter; unfortunately the archives of the College of Physicians and Surgeons have been so badly preserved, it will be necessary to seek for this material elsewhere.

I should like to thank Mr. Wilmer R. Leech and Mr. Edmund Bondurant Morrison of the Manuscript Division of the New York Public Library for their help in making this material available to me.

MEDICO-HISTORICAL NEWS AND ACTIVITIES

THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE

CONSTITUENT SOCIETIES

The William Welch Society of New York University College of Medicine

Through unavoidable circumstances the following report of the Society's activities during the past year was received too late for inclusion in the Transactions number (July, 1946):

The William Welch Historical Society of the College of Medicine of New York University has continued to function throughout the past war years, although affected by the war, like so many other activities not directly related to the war effort. With many of the faculty away and the students on the accelerated program and in military training groups, the Society decreased its activities. Two meetings were held on the history of this College of Medicine. Of particular interest has been the definite trend towards relating medicine to society, politics and the humanities in a more active manner, as presented in the meetings of the past two years. One meeting in particular on "The Humanities in Medicine" was well attended and well received. The Society has plans for the future, ultimately hoping to fit into the activities of the Department of Humanities of the Medical Center now being planned and developed at Bellevue Hospital and this Medical School.

HENRY E. ALTENBERG.

The Beaumont Medical Club, New Haven, Conn.

The Beaumont Medical Club will join with The Nathan Smith Club at the Historical Library of Yale University School of Medicine on the evening of October 25, 1946 to celebrate the centennial of surgical anesthesia. The speakers will be Mr. Alexander H. Beaton, Dr. Burness E. Moore and Dr. John F. Fulton.

NATIONAL NEWS

The Ether Centenary

October 16, 1946 is the 100th anniversary of the first successful public demonstration of ether anesthesia by W. T. G. Morton at the Massachusetts General Hospital. To commemorate this event medical groups throughout the country are holding celebrations, the chief of which is a three-day research symposium attended by more than 5,000 research scientists, physicians and surgeons at the *Massachusetts General Hospital* on October 14-16.

A complete list of the local celebrations is not available at present. *The Beaumont Medical Club* of Yale University School of Medicine will hold a meeting on October 25 (cf. under *Constituent Societies*). *The Department of Pharmacology of the University of Maryland School of Medicine* held exercises on October 16 in the Bressler Library with the following program:

Dr. John C. Krantz, Jr., Presiding
Professor of Pharmacology
University of Maryland, School of Medicine

Invocation

The Rev. Dr. Walter Thomas Jackson
Pastor, Faith Presbyterian Church
Baltimore, Maryland

Welcome

Mr. Charles McCormick
Regent of the University of Maryland

Anesthesia: "A Tide in the Affairs of Man"
"Surgery Before Anesthesia"
Dr. Henry E. Sigerist
Professor of the History of Medicine
The Johns Hopkins University

"Dr. W. T. G. Morton and Ether"
Dr. J. Ben Robinson
Dean of the School of Dentistry
University of Maryland

"Anesthesia Today and Tomorrow"
Dr. Henry S. Ruth,
Editor, *Anesthesiology*
Philadelphia, Pa.

A painting by Mr. Stanley M. Bell on "The First Administration of Anesthetic Ether" was then presented to the Department of Pharmacology by Dr. H. A. B. Dunning and unveiled by Mrs. Constance Black. The program concluded with a song "The Patient Sleeps" based on a poem by William E. Henley sung by The Rev. John Hedeman. Music was composed for the occasion by Theodore Chanler.

In the *Institute of the History of Medicine of the Johns Hopkins Medical School* Dr. Owsei Temkin delivered a lecture on "The History of Anaesthesia" on October 16. An exhibit was prepared for the occasion in the William H. Welch Medical Library.

At the *Library of Congress* in Washington an exhibit of books, prints and manuscripts on the development of anesthesia opened on October 16 to commemorate the anniversary together with the Army Medical Library. It will remain on view until November 30, 1946 on the Main Floor of the North Gallery in the Library. This exhibit illustrates the growth of man's knowledge of anesthesia from pre-anesthetic days until modern times. Among the rarities shown is a dissertation published at Rostock in 1718 which contains one of the earliest known uses of the term anesthesia. The dissertation is from the collection of the Army Medical Library. Other notable items include papers from the Crawford W. Long Collection in the Library of Congress and one of the rare *Letheon* tracts by Dr. Morton explaining the use of his new anesthetic. The Army Library also sent photostats

of pioneer American publications on anesthesia to the Wellcome Historical Medical Museum, London, where an exhibit was prepared in honor of the anniversary.

Several new publications by Henry Schuman, Publisher, New York, will also mark the occasion. They include *Victory over Pain, A History of Anesthesia*, by Victor Robinson, M. D.; W. T. G. Morton's Memoir to the Academy of Sciences at Paris, *On a New Use of Sulphuric Ether*, presented in the autumn of 1847 and now for the first time reprinted, with a Foreword by John F. Fulton; *An Annotated Catalogue of Books and Pamphlets Bearing on the Early History of Surgical Anesthesia*, compiled by John F. Fulton and Madeline E. Stanton. The October 1946 issue of *The Journal of the History of Medicine and Allied Sciences* is devoted entirely to the history of anesthesia, with the major emphasis on the introduction of anesthesia into Latin American and European countries.

Cleveland, Ohio

Dr. Edward H. Cushing recently gave his collection of around 400 medico-historical books to the Cleveland Medical Library, of which he was Director from 1938 to 1941. The main reading room of the Library is a memorial to the Cushing family and contains oil portraits of Erastus (1802-1893), Henry Kirke (1827-1910), Edward F. (1862-1911) and Harvey (1869-1939).

The Cleveland Health Museum will exhibit the Clements C. Fry Collection of prints devoted to the "History of Medicine in Art" from October 14 to November 15, 1946. At a special preview on October 14 the prints will be discussed by Dr. Howard Dittrick, Director of the Howard Dittrick Museum of Historical Medicine.

Michigan

In 1942 a society was established by physicians engaged in industrial hygiene and occupational disease work. It was named the Ramazzini Society in honor of Bernardino Ramazzini (1633-1714), the Italian physician who wrote the first extensive monograph on the subject of occupational diseases. During the war no meetings were held, but this year the members assembled on May 17-20 at the St. Clair Inn, St. Clair, Michigan. The first Ramazzini oration was given by Dr. Robert T. Legge, Berkeley, Calif., on "Bernardino Ramazzini: His Life, Deeds and Book."

New York, N. Y.

It is with deep regret that we report the death of Dr. Emanuel Libman on June 28, 1946. One of the world's most distinguished diagnosticians, Dr. Libman was also keenly interested in the history of medicine. In 1929 he gave $10,000 to the Johns Hopkins University for the establishment of a lectureship in the history of medicine to be named after his friend Hideyo Noguchi. Eight courses of Noguchi Lectures have been given in the Johns Hopkins Institute of the History of Medicine up to the present time.

Philadelphia

The program has been announced for the centennial celebration of the founding of the Northern Medical Association of Philadelphia. At a banquet which is being held at The Bellevue-Stratford Hotel on December 5, 1946 Dr. W. Wayne Babcock will be the Toastmaster, and Professor Richard H. Shryock, Professor of History

and Lecturer in the History of Medicine, University of Pennsylvania, will be the guest speaker.

A historical volume is being prepared for the Centennial under the Chairmanship of Dr. Maurice S. Jacobs. Among the contributors to this volume are: Drs. Myer Solis-Cohen, Assistant Director of Public Health of the City of Philadelphia, and President of the Association; Milton K. Meyers, Daniel Longaker, Hyman I. Goldstein, Moses Behrend, Albert Behrend, Harold F. Robertson, William Egbert Robertson and Irwin S. Meyerhoff.

Wisconsin

At the Fourth Annual Convention and Centennial Meeting of the State Historical Society of Wisconsin which was held at Prairie du Chien on August 23 and 24, 1946 Dr. Arno B. Luckhardt of the University of Chicago was the principal speaker. He discussed "Dr. Wm. Beaumont and the Medical Epic of the Northwest Territory." It was at Ft. Crawford near here that Beaumont performed many experiments on Alexis St. Martin and compiled his notes for the classic publication "Experiments and Observations on the Gastric Juice."

NEWS FROM ABROAD

Ontario, Canada

At the annual meeting of the American Diabetes Association in Toronto on September 16-18, 1946 the twenty-fifth anniversary of the discovery of insulin was celebrated. Dr. Frederick G. Banting and Mr. C. H. Best made their first announcement of having isolated a substance from the pancreas that lowered the sugar content of the blood at a meeting of the University of Toronto Physiological Journal Club on November 14, 1921.

France

Plans are under way for the reestablishment of the bronze statue of the two French pharmacists who discovered quinine, Pelletier and Caventou. During the Nazi occupation of Paris the original statue was among those which were pulled down and melted to supply metal for weapons. On May 8, 1946 a Comité provisoire du Monument Pelletier et Caventou was established by individuals interested in the history of medicine and pharmacy and by the chemical and pharmaceutical industries. Dr. George Urdang, Director of the American Institute of the History of Pharmacy at Madison, Wis., has been appointed the United States representative charged with establishing an American committee to raise funds for the project.

The bronze statue of Claude Bernard in front of the Collège de France was also melted down by the Germans. It has been replaced temporarily by a statue made of stone.

This year marks the fiftieth anniversary of the death of Louis Pasteur. In Paris memorial ceremonies, to which several foreign scientists will be invited by the French government, will be held early in December and Pasteur's works will be exhibited at the Palace of Discovery.

Peru

The report of the activities of the Peruvian Society of the History of Medicine for the year 1945-1946 has been presented in detail by its president, Dr. Carlos E.

Paz Soldán, in *La Reforma Médica*, 1946, Vol. 32, No. 478, pp. 427-429. The following papers were read by members of the Society:

April 24, 1945 "El drama nervioso de la Mariscala"
Dr. J. B. Lastres

"Historia de la transfusión sanguínea"
Dr. Muñoz Baratta

August 22, 1945 "La cátedra de Historia de la Medicina de la Facultad de Medicina de Lima y Juan Copello"
Dr. C. E. Paz Soldán

"La medicina aborigen peruana"
Dr. J. B. Lastres

December 11, 1945 "Roentgen y su obra"
Dr. O. Soto

March 29, 1946 "Las relaciones históricas de le Medicina peruana y ecuatoriana"
Dr. M. Madero

CORRIGENDA

Dr. Mordecai Etziony who published the article "The Hebrew-Aramaic Element in Vesalius, a Critical Analysis" in the June, 1946 issue of this *Bulletin* (pp. 36-57) has asked that the following correction of his article be noted:

"On page 55, under Ω 1, 2, 3, I discussed the Hebrew Aramaic equivalent of talus, viz., עַרְקוֹם haarchom. There I said in the second paragraph: 'The proper transliteration of the term seems to be arkom although as such it is meaningless in Hebrew. But if we change עַרְקוֹם arkom into עַרְקוֹב arkov or arkuv, which is philologically syononymous with אַרְכּוּבָה arcuvah, then its meaning is curve, the inner angle of the knee, here—the inner angle of the ankle,' etc.

"A few days ago I had occasion to come across the Aramaic form of the word עַרְקוֹם arkum found in the Talmudic literature as עַרְקוּמָא arkuma, or עוּרְקְמָא urkama, or עוּרְקוּמָא urkuma, which is related to עַרְקוֹב arkuv or arkov, and is, as I have already pointed out in the article, philologically related to אַרְכּוּבָה arkuvah. Thus it was my ignorance that was responsible for putting an innocent Hebrew term out of existence. References of the term עַרְקוּמָא are amply quoted by Jastrow in his Dictionary of the Talmud."

BOOK REVIEWS

WILLIAM F. PETERSEN. *Hippocratic Wisdom. A Modern Appreciation of Ancient Scientific Achievement.* Springfield, Illinois: Charles C. Thomas, 1946. xix + 263 pp. $5.00.

This book presents a cross section of the whole content of the so-called works of Hippocrates. In the first part (pp. 1-151), excerpts from the philosophical, physiological, therapeutic and surgical writings are conveniently grouped in twelve chapters dealing with the main aspects of Hippocratic medicine; an intermediary text, or commentary, provides an evaluation of the passages selected, and points to the relation of ancient and modern medical thought. In a short résumé a general appreciation of the Greek merit is added (pp. 152-162; cf. also Introduction, pp. ix-xix). The scond part, the "Appendix," supplies the references and the notes which discuss in greater detail the scientific problems at issue (pp. 165-2 Finally, there follows a glossary, an index of illustrations and of contents (pp. 243-263). To my knowledge, this collection of "Hippocratic Wisdom" is the most comprehensive survey of the doctrines proposed in the *Corpus Hippocraticum* that is available in English.

With such a short characterization of the book under review I should perhaps consider my task done. For, as Dr. Petersen says in his introduction, "this is not a book for Greek scholars—it is written for young physicians and for medical students" (p. xi). And later on he adds: "The interpretation is thus physiological and medical, not philological and historical" (p. 165). Being but a philologist and an historian I am not in a position to praise or criticize a physiological and medical analysis. Yet, Dr. Petersen has interpreted translations selected and in part corrected by him; he has defined the meaning of terms used by Greek writers; he has outlined a picture of Greek medicine as he supposes it to have been. Thus, although preoccupied with scientific questions, he has also been concerned with the solution of linguistic and historical problems. To this extent at least, I think, it is not improper for the philologist and historian to judge Dr. Petersen's results and to this extent I consequently feel allowed to scrutinize his book and to evaluate it.

For the rendering of the texts on which his argument rests, the author has relied on standard translations (p. xiv), that is, he has accepted by preference the translation of Jones; Sticker, Littré and Kuehlewein have been used for comparison (the last apparently in regard to variant readings); Kapferer's notes have also been considered (p. 165). Yet this short summary does not give an adequate impression of the range of the work done by Dr. Petersen. Jones' translation, as well as that of Adams—I wonder why the latter was not consulted, it is quite worthy of being taken into account, and after all it was made by a physician—both these translations include only a small part of the *Corpus Hippocraticum*. Since Dr. Petersen draws material from almost all the Hippocratic writings, his contribution to the Englishing of Hippocrates passages is quite considerable. And if I may express an opinion in the matter, his renderings read well. They are usually

phrased in a clear and vivid language; the content is expressed with simplicity and brevity.

As for the correctness of those translations which Dr. Petersen reproduces *verbatim*, I do not intend to offer any criticism. One might, of course, argue about many points. Even Jones' excellent rendering can sometimes be questioned. On p. 67, for instance, I should say with Littré: "She did not eat anything the whole time" instead of "No appetite for any food the whole time"; or on p. 34: ". . . it [Asia] is not oppressed with cold either, yet it is damp and wet by excess of rains and snow" instead of ". . . it is not oppressed with cold, nor yet damp and wet with excessive rains and snow." I mention these two examples only in order to impress upon the reader the fact that throughout Dr. Petersen's book he is faced with translations, that is, with interpretations, that divergence of opinion may exist among the translators even concerning the meaning of passages as simple and factual as the ones referred to, that if he wishes to evaluate the correctness of a translation, he should not fail to differentiate between the various translators—Jones, Kapferer, Littré, Sticker are not on the same level. I wish Dr. Petersen had always indicated not only the Greek source but also the source of his translation; this would have greatly facilitated the critical study of his book. In many cases, I also wish that he had accepted one translator rather than the other. But Dr. Petersen has given those renderings which he has judged best, and in general he has given them with fidelity and accuracy. In checking a fair number of his selections—I have naturally not compared all of them with the original—I have noted only two major defects. First the omission of whole sentences within a given context has not been marked; there ought to be some indication of a lacuna—for instance, on p. 33 after *those of the other*, or on p. 48 after *at all ages*—for one expects to become acquainted with Hippocrates' thought and for this purpose one should be told whether one is reading his words in their entirety or not. Second, relatively often a few words of the Greek text have dropped out in the translation. Thus on p. 61 one must add after *lung abscesses*: especially those from pleurisy or pneumonia; after *phlyctenae may occur about the body*: the patients repudiate food; after *the very beginning*: from the above mentioned signs which will appear and from the pain in the beginning; after *fortieth day*: and sixtieth day; after *about the twentieth day*: for those whose suffering is easier it will be retarded in proportion.

To turn now to Dr. Petersen's corrections of the standard translations, they consist mainly in the introduction of modern scientific terms. In a few cases, the elimination of the ancient concepts takes place before the very eyes of the reader. Thus Dr. Petersen writes on p. 26: "Male seed (*semen*) passes into the uterus and there commingles with the female seed (*egg*)." Hippocrates' obsolete theory of generation here is parenthetically identified with the modern one. But in the next sentence it is said: "While both semen and egg are necessary . . ." The Greek, of course, again has male and female seed (and even Kapferer, in his translation, has kept the terms of the original and in a footnote has stressed the difference of Hippocrates' views from those of later times). Having once adopted the words semen and egg, Dr. Petersen employs them throughout the next two sentences until the translation must return to the old concepts in order to make the statement meaningful at all, and suddenly one reads: "The same male may produce seed

of different potentials . . . , and so, too, may the female. . . ." But it is only rarely that one can follow up the process of change in such a way. In the great majority of the passages, one is confronted with modern terminology pure and simple. One finds: "The growing organism is organized by the warm air. Like goes to like; all material goes to its predestined related tissue from which too it has originated" (p. 29). Or one hears of gastrointestinal activity and of metabolism (p. 73). Instances of this kind are very numerous; I need not collect them; everybody will find them for himself.

Now in my opinion, such translations impute to Hippocrates doctrines that doubtless were unknown to him. The impression is given that the Hippocratic physicians were scientists in the modern sense, which they certainly were not. The statement, for instance, in which Hippocrates, according to Dr. Petersen, speaks of organism, organize, predestined tissues, this statement, to the best of my knowledge, actually reads: "The flesh [of the embryo] having been increased through [the influence of] the air is divided into members, and of it like goes to like, the solid to the solid, the loose to the loose, the moist to the moist, and each goes to its proper place according to the kinship [homogeneity] from which it originated." This, to be sure, sounds less modern, but I think it is a more adequate translation of the Greek (and by the way almost identical with Littré's translation). Yet Dr. Petersen would probably counter my assertion with the claim that by expressing the views of Hippocrates in the medical terminology of today he has succeeded in bringing out what the physician Hippocrates meant to say, while my rendering simply shows that I rely on dictionaries and that I do not know medicine. I have advisedly said that Dr. Petersen would probably make this objection, for so much, it seems, was the application of modern terms to Greek medicine a foregone conclusion to him, that he does not even mention or justify his procedure in his introduction, or in any other place of his discussion proper, as far as I am aware. I have gathered his arguments from the introduction to a new translation of Hippocrates which he contemplated undertaking with the late E. Andrews. (Since the programmatic remarks outlined by the latter have been printed by Dr. Petersen [pp. 167 f.], I trust I am not doing an injustice to him by assuming that they have determined his own course.) Here it is said that "in the past Hippocrates was utterly unreadable" and that this was often "due to the fact that the English translator, being hopelessly ignorant of modern medicine, often looked up his words in Greek dictionaries published half a century or more ago, as many of the best were" (p. 168). It is true, I am hopelessly ignorant of modern medicine, and I have consulted a dictionary. Yet I have not used one published in the 19th century, but rather Liddell and Scott, *A Greek-English Lexicon*, re-published in 1925 and the following years, an edition for which Dr. E. T. Withington, physician, translator of Hippocrates and historian of medicine, read "the whole of the extant remains of Greek medical literature, and there is scarcely a page in the Lexicon which does not bear traces of his handiwork" (L. & S., p. vii). Dr. Withington certainly was not hopelessly ignorant of modern medicine, and yet I cannot find any of the terms employed by Dr. Petersen in Liddell and Scott. The reason is, I think, that Dr. Withington tried to understand the Greek words, as the Greeks intended them to be taken, regardless of the progress of modern medicine. And thus indeed

they must be understood, they must be interpreted in their historical connotations. Otherwise an entirely distorted picture of the past obtains. By introducing modern terminology Dr. Petersen has seriously invalidated the correctness of the translations which he presents, and I cannot agree with him when he expresses the belief that "the use of standard translations" has protected him from the charge of "reading something into the text" (p. xiv).

The unhistoricity which the passages quoted have taken on through Dr. Petersen's corrections, moreover, is heightened by the setting into which he has fitted most of his material. I have no quarrel with those who think that they will get ancient medicine across, as the phrase goes, by dramatizing it. But it is a definitely inappropriate framework that is here chosen. Hippocrates is made to lecture to his students (pp. 87-125), patients are presented (p. 107); the reader is asked to imagine that he has taken a seat "in the white marble amphitheatre that was attached to the surgical dispensary of Hippocrates" (p. 86). The Greek students of the fifth and fourth centuries were not lectured to. There was no marble amphitheatre attached to a surgical dispensary in which the pupils came together. There was no presentation of cases similar to that in modern hospitals. Dr. Petersen, I am sure, would object even to a movie that in representing the history of Henry V would introduce as stage accessories a jeep and an airplane. That Shakespeare gave the Tudor rapier to the quarrelsome gentlemen of the time of Henry V he would at best excuse as poetical license. The anachronistic manner in which he himself proceeds in a scientific book seems the more objectionable to me, since it serves to confirm the impression, already aroused by the text proper, that Greek medicine and modern medicine after all are not so different.

But Dr. Petersen has not only corrected passages and placed them against an imaginary background, he has also arranged the material in a manner of his own. Rarely does one read two or three pages which are taken from the same book. While page 63 is made up of eight quotations from the *Coan Prenotions*, p. 64 consists of excerpts from *Places in the Body*, *Coan Prenotions*, *Epidemics VII*, *Diseases II*, and p. 52—half a page really—is made up of selections from *Humours*, *Ancient Medicine* and *Breaths*. Nevertheless the reader is asked to take all these statements as a unity. In the introduction of E. Andrews to which I referred before I find the admission that "such a method at once lays one open to the charge of indirect misquotation by changes in context. This may be a very serious charge." Yet Andrews adds: "I can only say that we have tried desperately to avoid such pitfalls and have always been acutely conscious of the inherent faults of the method and its possibilities for leading one astray" (p. 168). I consequently presume that Dr. Petersen has acted in the same spirit, although I admit that I am doubtful of the possibility of remedying "the inherent faults of the method." And the fact remains that all these excerpts taken together are supposed to represent the views of Hippocrates, not the "historical" Hippocrates to be sure—for Dr. Petersen is not concerned with the question whether the Hippocratic books are genuine or which are the authentic ones, he grants that they were written by various people, that "they cover a longer time period than that of the life span of one individual" (p. 165). Still, the quotations embody the "Hippocratic thesis"; Dr. Petersen has followed "an apparently original line of thought that binds the whole," and the thesis which he defends "is foreshadowed in *Ancient Medicine*;

is basic (but overgrown with weeds) in *Breaths*; carries through in *Sacred Disease* and *Regimen*; and finds its clearest expression in *Airs, Waters, Places*" (p. 169). Even the most ardent "unitarian" of the 19th century, or of antiquity for that matter, would have found it difficult to defend the compatibility of these books. To make his assumption convincing Dr. Petersen envisages an Hippocrates who in his youth was imbued with the doctrines of Anaximenes and Anaxagoras, then after long travels came also under the influence of Democritus, and still later adopted in addition certain views of Heraclitus (pp. 172-173). Were such a man known to have lived, I would grudgingly admit his existence. To postulate his reality I should not dare. That supposing he ever did live, he was "the physician who had an understanding of the body and its dysfunctions unsurpassed for twenty-three centuries" (p. 153), I cannot believe.

Thus far I have dealt only with Dr. Petersen's presentation of the material. It is time for me to consider the more interpretative parts of the book under review. Here I notice first of all that, according to Dr. Petersen, Hippocrates "wrote for the many. That the many might understand, he used the current word symbols. He accepted the prejudices of the time" (p. xiv). To say: "Prayer indeed is good, but while calling on the gods a man should himself lend a hand" is common sense in a social milieu where superstition and religion still held sway among the multitude, and the author considers it legitimate "to interpret some statements of the texts in the light of such asides" (p. xv). In other words, Hippocrates did not write down everything he knew; there is a kind of hidden truth in his utterances. Or as the programmatic remarks formulate it: Hippocrates "was a philosopher. He was hence well versed in that peculiarly abrupt telegraphic lingo whose solution has been the cause of untold heartaches until modern Greek scholars guessed the correct answer: that is, that it was intentionally misleading—a sort of secret code by which members of the initiated pass on cosmic thought to others of the favored few" (p. 168). I do not know who the scholars are who are here referred to, or who those are on whose authority Dr. Petersen bases his verdict. Whoever they may be, I dare say they are mistaken. No Greek philosopher or physician of the classical period was intent on hiding the truth which he had found. Nobody hesitated to write about the genesis of the cosmos, or of man, or about the nature of diseases, as he saw fit. The greatest heresies were discussed and defended openly, as the preserved documents attest, even the existence of the gods was openly challenged. If a philosopher or a physician wished to use the current word symbols in a different sense because otherwise they would not conform to the peculiar bent of his thought, he said so. Dr. Petersen himself prints the statement of Hippocrates which is evidence of this fact: "When I speak of 'becoming' or 'perishing,' I am merely using popular expressions; what I really mean is 'mingling' and 'separating'" (p. 131). In some notes of E. Andrews, in which he opposes Jones' translation of two fragments of Heraclitus, I find that he objects to Jones' rendering of *logos* by *Word* because "it's positively Biblical and smacks of a bewhiskered Jehovah, whom the Greeks were spared for five more centuries" (p. 167).[1] To my mind, the assumption of a hidden meaning of the

[1] Incidentally, the criticism of Jones' translation is quite unwarranted. Although *Word* for *logos* sounds Biblical and although *logos* is also defined "in dictionaries as

Hippocratic writings, or of any philosophical statements of the fifth and fourth centuries, is much more "Biblical," and smacks of those who believed to serve the cause of their Master by speaking of a double truth hidden in divine revelation, or by writing themselves in the language of double truth. Such men, the contemporaries of Hippocrates indeed were spared, and theories similar to theirs have no place in the interpretation of the Greek material with which Dr. Petersen is dealing.

I must confess that I am sceptical also of the appropriateness of the author's second principle of interpretation, that of symbolic interpretation. As Dr. Petersen phrases it, reliance on the work of others has not deterred him "from substituting certain modern equivalents for words used in a symbolic sense by the Greek physician." And he continues: "The strangely sounding '*Fire and Water*' is, for example, simple enough when we realize that these terms symbolized our catabolism and anabolism, our energy and matter" (p. xiv). I am not aware of any testimony that would justify the claim of a symbolic use of words on the part of Hippocrates, nor does Dr. Petersen explain what is the basis of his supposition of such a usage, or under what conditions he feels free to interpret a concept as symbolic. From the passage just quoted and from a further discussion of the same example given later on in the book (pp. 128 f.), I can only infer that the author's view is the following: whenever a Greek term sounds strange—because it is utterly irreconcilable with modern scientific opinion, I suppose—the interpreter asks himself whether this term may not have symbolic implications. He then ferrets out whether if taken symbolically it might not coincide with the results of the most recent investigations. Thus the concept of the "hottest and strongest ethereal fire" becomes "to all intents and purposes, the formulation of a modern energy concept, namely, the transmission of energy in wave motion. Until recently considered as immaterial, it is now accepted as involving the transmission of matter, in a form that has weight" (p. 128). Or to put it differently: "We accept energy as wave motion that transmits matter—Hippocrates said fire (*energy*) imperceptible to sight or touch, that contains water (*matter*)" (p. 129). And the terms fire and water are then used by the interpreter "with acceptance of the implication

'reason,'" *Word* is the meaning here required. Historians of Greek philosophy are agreed in this respect (cf. e.g. J. Burnet, *Early Greek Philosophy*, 1930, p. 133, n. 1). Nor are the new renderings of the two fragments that are proposed an improvement. As for the first, *all things* for *panta* is a perfect translation, and it is not true that *panta* is "the ordinary Greek word for Nature" (again Jones agrees with Burnet, *op. cit.*, p. 132). The word *essential* which Andrews has is not indicated in the text at all. Jones' translation seems in every respect superior to that of Andrews and the correctness of the latter does not become more convincing by such statements as: "Now how could it have meant anything but this? After all a man whom Aristotle revered and annotated couldn't have written as Jones would have it" (p. 166). I do not feel impressed either by the fact that in the rendering of the second fragment of Heraclitus not a single word is translated "in terms that cannot be found as definitions even in a small Greek dictionary," or that some renderings "are quite in accord with ordinary Greek usage" (p. 167). What would scientists say, were a philologist to write on medicine on the basis of small dictionaries and ordinary usage of words? Jones is again correct and in agreement with Burnet (*op. cit.*, p. 133).

that Hippocrates had anticipated our modern observations, achieved by the most delicate of instruments" (ibid). Granted for argument's sake that Hippocrates—or rather Heraclitus (cf. notes on p. 231), but Dr. Petersen considers Hippocratic the treatise on *Regimen* which reproduces Heraclitus' philosophy—granted that Hippocrates, when he spoke of imperceptible fire, mixed with water, was interested in the explanation of the same phenomena in which those are interested who speak of matter and energy, it would still make all the difference in the world that to Hippocrates, or Heraclitus, both fire and water were qualities or substances. For fire, though not perceptible to sight or touch, exists in some material form just as does water; it must be nourished by water, and so forth (cf. J. Burnet, *Greek Philosophy*, I, 1928, pp. 59 ff.). In my opinion, nobody who wrote before Plato and Aristotle—and most of the Hippocratic books were written before their time; certainly that on *Regimen*—could have understood a discussion about matter and energy as such. Simple historical considerations make it impossible to link the Hippocratic theory with the modern theory—even if the presupposition of symbolic meaning were acceptable at all. And I wonder whether even in cases in which ancient and modern thought can be linked together, the scientist will find in the Greek texts more than a weak glimmering, a dim foreshadowing of his own doctrines, whether he will ever find what one might really call an anticipation of his theories (it may be otherwise with facts). For scientific thought develops and changes, and "one cannot enter the same river twice," as Heraclitus says.

But at this point I strike my colors and lay down my arms. For if I went any further, I might become involved with Dr. Petersen's third principle of interpretation, that of medical interpretation. His own findings have provided "a modern verification of the ancient clinical observations, by answering the hows and the whys." And he has decided to write his commentary because he "found it fascinating to piece together some of the basic observations and clinical deductions and make coherent pictures from apparent jig-saw puzzles" (p. xiii). I have admitted from the beginning that I am not competent to follow him in this undertaking, and all objections made from my point of view do not, of course, imply that his book is without value in regard to those questions which he has at heart. Only this much I venture to say: that his commentary contributes to the "knowledge of the historical continuity of the tradition" which is indispensable today (p. xv) seems doubtful to me. For the picture of "Hippocratic wisdom" which he presents to the student and to the young physician contains a great number of details which are unhistorical. Nor can I succeed in persuading myself that the picture as a whole nevertheless is a more or less adequate likeness, as it sometimes happens that in spite of the incorrect drawing of details the face or figure of a person emerges lifelike in a portrait.

In offering my criticism it has certainly not been my intention to reopen the time-honored debate as to whether the physician or the philologist is the better qualified interpreter of Greek medicine, a debate to which Dr. Petersen himself alludes, quoting Pitschaft's opinion, according to which "only a physician should interpret the Hippocratic texts, for the opinions of the school man can have little usefulness in so practical a field as medicine," and that of Much, according to which "only a physician is justified in interpreting the physician Hippocrates . . .

others . . . should confine themselves to the religiophilosophic or purely humanistic phases" (pp. 165 f.). I for one do not believe in the mutual exclusion of the two approaches, and I plead for cooperation between the scientific and the philological interpreter. Obviously, it is the task of the physician to judge about the diseases described, about the treatment followed, to appreciate the value of Greek medicine. This is not the business of the philologist, and here he must be guided by the physician. But if the scientist takes upon himself the responsibility of interpreting the Greek texts, if he is to establish their medical significance, he must start from the groundwork laid by the philologist, he must inquire about certain facts that can be established through philological and historical research.

For in history no less than in science, there are facts which one cannot afford to overlook; new discoveries are made which one must take into account, and doubtful instances ought not to be considered certain. The scientist will not allow himself the slightest deviation from the evidence while he is experimenting or describing natural phenomena. Being a stickler for facts, for precision, in his own field, he should not adopt a different attitude when turning to the interpretation of past phenomena. In a biography of Hippocrates it is no longer possible to speak of Cos as "Temple site of Asklepios" (p. 171). The Coan temple, as the excavations have shown, was founded around 300 B. C., that is, decades after the death of Hippocrates. Nor did Hippocrates write "for the group of properly trained and accepted physicians of the guild of Asclepios" (p. 47, n. 1). The Hippocratic books were available to everybody, and the "guild" of physicians was not interested in the training of its members; no medical examinations were given. One cannot quote an Hippocrates letter as Hippocrates' work, *On mental disease* (p. 48, cf. 199); all these letters were composed in the first century B. C. (Hippocrates therefore cannot be credited with knowing of contagion.). Simply to maintain that the name Asclepius signifies "clear bright air after a storm" (p. 46) is unwarranted after the admission of eminent Greek scholars that they are unable to give any etymology whatsoever. Again, that Hippocrates met with Democritus (p. 172) is at best doubtful and attested only by late sources, among them the spurious Hippocratic letters. That Hippocrates practiced human anatomy (p. xiv) is, to say the least, uncertain and the reader should be informed of arguments that speak against this assumption. Whether Hippocrates had "an excellent understanding of the anatomy of the circulation (heart, lungs and vessels)," this issue depends on the minute interpretation of texts and it cannot be solved by reference to one article that is in favor of a positive answer (p. 22).

To repeat it once more, it is certainly the province of the physician to interpret Hippocratic medicine so that the presentation of its wisdom can "develop a point of view—a wide horizon" (p. xix). I cannot believe, however, that he will achieve this aim—the highest aim indeed which can be set for an interpretation of Greek medicine—unless he is willing to learn from others, just as others must be willing to learn from him, unless in fine he proceeds as did his master Hippocrates of whom the ancients said that "he knew neither to deceive nor to be deceived."

LUDWIG EDELSTEIN.

LEONARDO OLSCHKI. *Machiavelli the Scientist.* Berkeley, California: The Gillick Press, 1945. 58 pp. $1.50.

That Machiavelli's attitude toward politics was a scientific one has often been maintained. In his small but meaty book, Olschki has set himself the task of defining exactly what this vaunted scientificism signifies (p. 23).

To put his result (ch. III-IV) into categories of historical relationship: the scientist Machiavelli is spiritually a kinsman of his contemporary Leonardo da Vinci, and a forerunner of Gallilei. Like Leonardo, he was an empiricist, freeing himself from metaphysical and teleological presuppositions. But Machiavelli succeeded where Leonardo failed: he established the "general rule" which the artist vainly strove to find, since he had the courage of basing his science on axiomatic assumptions. To Machiavelli "human nature was always and everywhere the same," and the real sense of history, in his opinion, could be grasped "because—in his own words—men, just as heaven, the sun and the elements, never had changed their motion, order and power" (p. 30). Such a conviction allowed him to build up a science of politics comparable to the science of mechanics which Gallilei founded on the axiom that matter is unalterable. And within the framework of this specific naturalistic system one must also interpret Machiavelli's main political concepts, *fortuna* and *virtù*. The reduction of the phenomena to two principal agents is "characteristic of a scientific approach," and similar to that achieved in Leonardo's two principles, "necessity and power," or in those of Gallilei, "gravity and inertia" (p. 35). Fortune in human affairs denotes the circumstances that hamper free activity, the "passive conditions of political success" (p. 38). Virtue is its active counterpart, the efficiency of an individual or of a collective body. The term is used by Machiavelli in its old meaning of *potestas quaedam efficiendi*, in the sense in which one may speak of the virtue of a plant or of a remedy (p. 39 and note 43).

This thesis of Olschki's is enticing, and it serves to throw light on many details of Machiavelli's views. It clarifies to a certain extent his peculiar concept of military history, the "Art of War" (ch. V). It explains his theory of imitation, the importance which historical *exempla* take on for him (pp. 43 ff.). Most significant perhaps, it strikingly illuminates the greatness and the weakness of Machiavelli's theories, his grasp of reality as it is and his blindness to inherent potential factors. As a scientist, he refuses to believe in that which cannot be observed to exist, while he ascribes to correct knowledge the certainty of success in human action, an unrealistic kind of political realism which did not escape the criticism of Guicciardini, "the true empiricist and realist among the theorists of politics of the Italian Renaissance" (p. 42).

I feel that, in his revaluation of the scientist Machiavelli, Olschki has laid bare one important aspect of Machiavelli's thought that has hitherto been overlooked. There is, however, to my mind, a certain overemphasis in the defense of his cause. Thus Olschki wishes to eliminate from the Machiavellian concepts of *fortuna* and *virtù* all the implications which these terms had to previous generations: "Only when we become aware of the fact that these words are technical terms of a rational system of political thought does their meaning become evident in their strict and definite limitation" (p. 39). Yet, Machiavelli's assertion that it is better to be

bold than to be prudent because *fortuna* is a woman whom one can master only if one beats and ill-uses her—this assertion certainly shows that Machiavelli has not quite attained the scientific composure and objectivity at which he was aiming, and that old attitudes, or old superstitions, are still deeply ingrained in him. Nor can I believe that at the end of the *Principe*, quoting Petrarca's verses on *virtù* and *antico valore*, he was impervious to the nobility by which human efficiency may be pervaded, just as it may fall prey to utter baseness. Machiavelli's political philosophy is not as "amoral" as it has been made out to be by those who defend amorality. For a proper limitation of Olschki's thesis it would perhaps have been important to differentiate more clearly between the Machiavelli of the *Principe* and of the *Discorsi*; the two works, it seems, embody two different approaches.[1] Another example of overemphasis I note in Olschki's attempt to separate Machiavelli's theories from those of the earlier humanists. Starting from an interesting and suggestive distinction of two types of humanists, the energetic and the aesthetic and scholarly one, Olschki places Machiavelli into the former group—men, who "interpreted the classical models and doctrines in the light of their professional experience and within the sphere of their practical problems" (p. 14; cf. 20). But the connection of Machiavelli's work with the learned humanistic tradition seems to me beyond doubt (cf. F. Gilbert, *The humanist concept of the Prince and the Prince of Machiavelli* in *The Journal of Modern History*, XI, 1939, pp. 449 ff.; esp. 477). There is, moreover, a greater influence of ancient authors, above all of Polybius, even on the scientific attitude of Machiavelli, than Olschki is inclined to admit (cf. the analysis of W. Dilthey, *Gesammelte Schriften*, II, 1923, pp. 24 ff.).

These possible objections, however, do not diminish the stimulating value of Olschki's book. He has contributed a characterization of the scientist Machiavelli which no interpreter of the achievement of the great statesman and theorist can leave unheeded.

LUDWIG EDELSTEIN.

NATHAN G. GOODMAN, Editor. *A Benjamin Franklin Reader*. Original drawings by Fritz Kredel. Text illustrations by Rafael D. Palacios. New York: Thomas Y. Crowell Company, 1945. xxi + 818 pp. Illus. $3.50.

Benjamin Franklin was such a warmly human man whose writings reflect so well his common sense, universal interest and his intellectual prowess that his letters, essays and papers could not fail to be charming and instructive to the reader. *A Benjamin Franklin Reader* edited by Nathan Goodman is a well chosen selection of his various works some of which have not been heretofore published. This Reader is not burdened with long introductions, for the editor limited his own words so that the greater part of the book is written by Franklin.

The book is arranged to give a cross section of the various aspects of his varied

[1] For a discussion of the present status of the studies on Machiavelli I refer the reader to F. Gilbert's essay on *Political Thought of the Renaissance and Reformation* in *The Huntington Library Quarterly*, IV, 1941, pp. 445-450.

life. Consequently there are divisions which include Franklin's thoughts on religion, science, diplomacy and the general welfare. There is a part devoted to his robust humor and good advice without which any book on Franklin would seem flat.

Included in the section on science which contains his theories about electricity as well as his inventions are some of his writings on medicine. Franklin was a first-rate observer and his ideas about exercise and fresh air, though not commonplace at his time, are widely accepted today. Although he was enthusiastic about electricity and even tried it upon paralytics, he was honest to admit that it was not successful. The accounts of his devising bifocal lens glasses and the design for the first flexible catheter in America were most interesting. However, it is doubtful if the short letter on mesmerism in which he states:

> and there being so many disorders which cure themselves and such a disposition in mankind to deceive themselves and one another on these occasions; and living long having given me frequent opportunities of seeing certain remedies cried up as curing everything, and yet soon after totally laid aside as useless, I cannot but fear that the expectation of great advantage from the new method of treating diseases will prove a delusion. That delusion may however in some cases be of use while it lasts. There are in every great rich city a number of persons who are never in health, because they are fond of medicines and always taking them, whereby they derange the natural functions, and hurt their constitutions. If these people can be persuaded to forbear their drugs in expectation of being cured by only the physician's finger or an iron rod pointing at them, they may possibly find good effects though they mistake the cause. . . .

can accurately be referred to as a suggestion of psychosomatic medicine.

Benjamin Franklin does not become boring after much reading. Because of the continuing interest in him this newest book containing his writings is a good addition to any library.

GWYNNETH GMINDER.

A. E. CLARK-KENNEDY. *The Art of Medicine in Relation to the Progress of Thought*. Cambridge: at the University Press, 1945. 48 pp. [New York: The Macmillan Company. $.75].

Recent discoveries and inventions have given widespread encouragement to an optimistic belief in medical science. Justified as such enthusiasm is regarding the many new possibilities of preventing and curing disease, it has, in some cases, overshot its mark. A sentiment has grown that scientific and clinical research, helped by ample means and, in one way or another, made applicable to an ever widening number of people, means everything. In his present publication Dr. Clark-Kennedy, physician to the London Hospital and Dean of the Medical School, shows himself an outstanding member of those who question this view.

The booklet represents a lecture in the History of Science course in the University of Cambridge. It theme is to "consider the way in which medicine, by bringing science and thought into intimate and personal relationship with humanity, has resulted in science making a greater contribution to thought than would otherwise have been the case" (p. 7). Consequently, the author's chief concern is with

the medical category of "disease": its conception, prevention and treatment and its relationship to the mind. In contrast to the ideas of the Greeks, the Renaissance and Thomas Sydenham, the modern concept of disease is said to depend on an interplay of three factors: man's genetic endowment, the environment (physical, psychological and cultural) in which he lives and his own behavior. The prevention and treatment of diseases is effected through the modification of one or several of these factors. This theme is developed in some detail by Dr. Clark-Kennedy and it gives him the opportunity of exemplifying the interrelationship between medical and philosophical thought. For instance he points out that medicine compromises between its traditional obligations towards the individual (relief of suffering, professional secrecy) and laws based on Christian standards of ethics (prolonging of life under all circumstances "even when this is contrary to the interests of the State, or likely to increase in the end the total suffering of the individual," p. 30). Also he feels moved to warn against seeing the combination of genetics and psychology as excluding "the existence of free-will, or a capacity for moral and intellectual judgment, independent of upbringing, education, and experience" (p. 42).

In the last section, entitled "Medicine and Modern Life," Dr. Clark-Kennedy summarizes his views with regard to medical education and the position of medicine between the humanities and sciences. In the first place he emphasizes the shortcomings of a curriculum purged of everything except science. "In medicine we are bound to deal with human life and experience as a whole, and half the art of medicine is to adopt a reasonable and practical attitude to the unknown. A purely scientific education is inadequate for the profession of medicine, and medical education is losing touch with the humanities at a time when the power of medicine to prolong life, relieve pain, influence endocrine secretion and to some extent instinct, control birth, dominate the mind, and even change the structure of the brain and modify personality, has increased, is increasing, and is likely to increase still further" (p. 43-44). This trend is all the more deplorable as medicine by its very nature seems destined to integrate sciences and humanities and mediate between philosophical extremes. "I may have an exaggerated opinion of the importance of my own profession, but for the time being medicine could, and medicine should, be the connecting link reconciling the conflicting points of view of the humanities, on the one hand, and the sciences upon the other. A purely scientific education is inadequate for a profession which deals with so close a relationship between mind and matter, and an education in the arts alone is insufficient for minds compelled to live in a material world. Yet philosophy has dropped out of medical education, and the tragedy is that medical education seems to trail along after a 'half-baked' materialism, already out of date, in an age when medicine could, and medicine must, help to integrate the arts and sciences in University education, if our sense of proportion is to be once more restored. Unless this can be done, we run the risk of losing our intellectual balance, and sinking in the sea of our widening knowledge." (pp. 45-46).

I do not agree with everything Dr. Clark-Kennedy says in this lecture, particularly as regards the two introductory sections on "The Hippocratic Period" and "The Renaissance." But since the author himself puts main emphasis on "modern medicine in relation to current thought" (p. 5) a discussion of the correctness and

justification of his historical statements can be dispensed with. I must also confess that I find it difficult to conceive of mind "as action in the nervous system" (p. 21) in sharp distinction from consciousness which becomes "the real mystery" (p. 21 f.). But here again I feel details to be of minor importance in the framework of the more comprehensive scope of the lecture. Of this scope I have tried to give an idea by direct quotations, especially from the last section which I should have liked to cite in full since every sentence deserves to be read in this country no less than in England.

O. Temkin.

René Leriche. *La Chirurgie à l'Ordre de la Vie.* Introduction par le Dr. Joachim Beer. Paris-Aix les Bains: La Presse Française et Étrangere. O. Zeluck, 1944. 249 pp. 1 fig.

This book appeared two years ago when communications with Europe were still almost inexistent. I am afraid that it thus did not find the attention in this country that it deserves, and I would like therefore to announce it here at least. I am not enough of a surgeon really to review it. The name of René Leriche is well known through his pioneer work in sympathicus, endocrine, and bone surgery. He now holds the chair of medicine at the Collège de France which once was the chair of Laënnec, Magendie, Claude Bernard, Brown-Séquard, d'Arsonval, and Charles Nicolle; and René Leriche is not inferior to this formidable ancestry.

This collection of essays written mostly in the 1930's, is of particular importance to medical historians as it includes analytical pieces of great originality on Lister, Claude Bernard, Antonin Poncet, Albin Lambotte, Charles Nicolle, Harvey Cushing, and William S. Halsted. The latter essay contains perhaps the most penetrating lines ever written on Halsted.

The bulk of the book deals, of course, with surgery itself, but in such a way that its discussions become of vital interest to every medical man or scientist. Leriche, who has been strongly influenced by Halsted and Cushing, develops his ideas of a new *physiological surgery*; a surgery seen no longer as a mere technique but in connection with life, the Bios; a surgery where manual artifices ("unsound romanticism") are subordinated to intelligence; a surgery that thinks in chemical as well as in mechanical terms; a surgery which profits from its unique character of an experimental art.

Those who still nurture the medieval prejudice that a great surgeon can not be at least as much of a great writer and thinker as any other great man, will be easily confounded by the brilliancy, clarity and force of Leriche's writing. A faithful pupil of Leriche, Dr. Joachim Beer, has ably introduced and edited these fascinating essays.

Erwin H. Ackerknecht.

J. T. RICHARDSON. *The Origin and Development of Group Hospitalization in the United States, 1890-1940.* University of Missouri, Columbia, 1945. 101 pp. $1.25.

In this informative monograph, Dr. Richardson has traced the development of group hospitalization in the United States and has recorded the essential features of present day Blue Cross Plans.

The author considers that group hospitalization has passed through three stages of development: 1. the Industrial and Single-Hospital Plans from 1890 to 1928; 2. the early Non-profit Hospital Plans from 1929 to 1936; and 3. the modern Blue Cross Plans from 1937 to 1942.

The mutual benefit associations are among the oldest organizations providing hospital care on a prepayment basis. They were sponsored by the lumber, mining and railroad industries, which utilized contributions from their employees to finance the construction and maintenance of medical care facilities in new communities in the western states.

Although during the first period, stock and mutual insurance companies sold disability insurance which often included cash indemnities for hospital expenses, they had far less influence on later developments than the single-hospital plans adopted by the Hospital Service Association of Rockford, Illinois in 1912, the Grinnel Community Hospital in 1921, the Brattleboro Memorial Hospital in 1927, and the Baylor University Hospital in 1929.

The Baylor University Hospital Plan is considered by most executive directors of Blue Cross plans to be the immediate forerunner of their organizations.

The early non-profit hospital plans, organized in the period from 1929 to 1936, took the important step from single-hospital organization to organization on a community basis. For instance, one of the first plans incorporated during this period was the Associated Hospitals of Essex County, Newark, New Jersey, which comprised seventeen hospitals in that area. Other plans organized at this time included the Sacramento Insurance Company in 1932, the St. Paul Plan and the Durham, North Carolina, Hospital Care Association in 1933, and the Hospital Service Association of Cleveland in 1934.

Blue Cross plans developed from four nuclei in Newark, New Orleans, St. Paul and Washington, each of which had been influenced by the success of the Baylor plan. The Blue Cross plans became a formally organized movement with the establishment of the Hospital Service Plan Commission by the American Hospital Association in 1937.

The author indicates that there was a direct link between the report of the Committee on the Costs of Medical Care and the subsequent development of group hospitalization. Among the recommendations of the Committee on the Costs of Medical Care in 1932 was the approval of voluntary hospital insurance. With the subsequent attack on the Committee by the American Medical Association and the impracticability of raising funds in 1933 to implement its larger program, plans were apparently made by several individuals to promote hospital insurance, and a successful attempt was made to persuade the Trustees of the American Hospital Association to endorse the principle of group hospitalization in February 1933.

Of course, a far more persuasive factor was the depression which, as the author

points out, reduced hospital income from endowments and contributions by about two-thirds, while increasing the charity load almost four-fold. This was the driving force which impelled the hospitals to seek a solution of their difficult financial situation through prepayment plans.

The author discusses in detail the passage of enabling laws in the states; the organization and administration of Blue Cross plans; their contracts with member hospitals and with subscribers; their hospitalization experience; and their financial structure. Administrative costs were relatively high in the beginning and decreased with time. The administrative cost of 29 plans in 1940 ranged from 10 to 30 percent, average 18 percent, while in 1944 the average was only 12.3 percent.

The author describes the change in attitude of the American Medical Association towards Blue Cross plans from definite opposition in the early years to gradual acceptance and finally endorsement.

In concluding his study, Dr. Richardson points to two very serious deficiencies in the Blue Cross hospitalization plans:

1. "The facilities principally offered are for hospitalization in private and semi-private rooms, seldom for beds in wards, and the premium rates are accordingly too high for the lower-income segment of the population."

2. "As a rule the Plans are confined to large cities, pointing to a risk that unless care is taken no adequate geographical coverage will be achieved."

There is no doubt that the Blue Cross plans have made a very important contribution to the development of health insurance in the United States. It must be said, however, that despite their phenomenal growth in recent favorable years, they have not been able to reach the great majority of the American people, particularly the low-income and rural populations. It has become increasingly clear that full coverage for medical and hospital care of most of our population cannot be attained through voluntary health insurance.

MILTON TERRIS.

A LETTER TO THE EDITOR FROM DR. IAGO GALDSTON

June 25, 1946

I should like very much to comment on the review composed by Dr. Milton I. Roemer on Dr. Edward J. Stieglitz' monograph, *A Future for Preventive Medicine*, and published in the March issue of the *Bulletin*.

I am prompted to do this for the reason that in my opinion the review does little justice to the author of the book and even less to the reviewer. More important, however, is the fact that the review grievously misleads the reader as to the contents and perspectives of the monograph, and beclouds by partisan pleading a subject of major importance.

First as to the review: Out of a total of 75 lines, only 11 are devoted to describing what the monograph is about. 64 lines are given over to a libelous calumny of the author's point of view and to Dr. Roemer's pleading for health insurance.

Dr. Roemer charges Stieglitz with being a social Darwinist, and after tearing text from context to support this thoroughly unfounded charge, he indulges in a fatuous flight of rhetoric, asking: "In what community would the writer have us stop pasteurizing the milk supply so that the 'unfit' might be carried off by enteric fevers?" One is forced to the conclusion that either Dr. Roemer didn't read the monograph, or having read it couldn't quite understand it, or having understood it was so biased and so prejudiced that he couldn't help oppose its arguments with whichever of his persuasions first bubbled up.

Let us face the crux of the charge, that of social Darwinism. Dr. Roemer quotes several lines torn from their context to prove his point, but on the very same page (31) Dr. Stieglitz has written: "We can offer no solution to this vital question here. Certainly the crux of the problem lies in the definition and indentification of the fit and unfit." Again (p. 32), "It is obvious that no group of men can ever be just judges of individual fitness; there are no criteria to fit all capacities." And finally (p. 32), "Approach to the problem by efforts to raise the level of health so that individuals may succeed in any environment does not have the objectionable by-product of fostering the survival of the less fit."

It is nothing short of malice to misconstrue the author's argument and to ask such questions as to where would he stop pasteurizing the milk supply. Time and again throughout this short, compact monograph, the author makes the point that *patchwork medicine such as is practiced today simply yields an "ailing population."*

In the summary of his monograph (p. 63), Dr. Stieglitz repeats the burden of his work:

> "If the objective continues to be merely the prevention of specific disease entities, little change in principles and practices can be anticipated. If, on the other hand, the concept of preventive medicine is broadened to include all activities intended to increase health, which is always relative in degree, than great and important changes are inevitable."

Not content with misunderstanding Dr. Stieglitz' thesis, Dr. Roemer serves up a strange hash about "age-specific increases." He elaborates this into some vague imputations that something about the way we live as a civilized society appears to contribute to the incidence of degenerative diseases. Dr. Roemer forgets that one of the factors contributing to the increased incidence of degenerative diseases is this very civilized society which has made it possible for people to live long enough to develop and to die of degenerative diseases.

The real crux of Dr. Roemer's argument is summed up in his pronouncement that "world experience, as well as American, has shown that broad programs of health insurance are the most practical solution in an industrialized economy." This, of course, is sheer nonsense, for if world experience (with health insurance) has shown anything, it is that preventive medicine goes entirely by the boards, that there is a degradation in the general quality of medical practice, and that there is a wide extension of that relatively futile and ineffective patchwork medicine against which Dr. Stieglitz' monograph is written in protest.

Messrs. Simons and Sinai in their work, "The Way of Health Insurance," comment on this fact in the following words:

> "When insurance systems are being urged upon governments, one of the strongest arguments offered is that improvement in general health will follow prompt, universal medical care. After the system has been adopted one of the most amazing things to the outside observer is the almost complete absence in the vast volume of discussion of any reference to public health in relation to insurance. . . . At no point has the disappointment been greater than in the failure of insurance as a preventive measure."

Dr. Roemer has a good time dragging in the old canard about free public education (vide the Harvard Report) and Lincoln's cliche about the common people. Dr. Roemer palpably made no effort to understand Dr. Stieglitz' monograph, but chose rather to use it as a platform from which to spout his own persuasions re medical insurance. All this is rather regrettable, for *A Future for Preventive Medicine* deserved a better fate in better hands.

ANSWER BY DR. ROEMER

July 7, 1946

Neither Dr. Galdston's outburst nor Dr. Stieglitz's essay is worthy of much comment beyond that offered in my review in the March, 1946 number of the *Bulletin*.

It may simply be pointed out that Dr. Stieglitz's presentation is so characteristic of social Darwinism that when it was shown to an American historian who just published a book on that subject, he exclaimed: "I had thought that social Darwinism was about extinct, but here it still is!"

To belittle and oppose the control of environmental hazards, with its "objectionable by-product of fostering the survival of the less fit" (as Dr. Galdston proudly quotes), in the advocacy of a program to strengthen the individual, is nonsense from an economic point of view and unthinkable from a social point of view. *Both* approaches are essential. The "patchwork" of current medical practice has

nothing to do with this issue nor with programs of health insurance which make medical resources available to people in time of need.

Dr. Galdston's remarks about "age-specific increases" in the degenerative diseases reveal that he has no understanding of this elementary concept. The point is that rises in age-specific death rates from these diseases are over and above the influence of the increased longevity of the population.

It is difficult to understand how individualistic, *laissez-faire* economic relations in medicine are particularly favorable to the preventive care of geriatric disorders. It is unfortunate that neither Dr. Stieglitz nor his vituperative defender recognizes that opposition to public action in the distribution of medical care serves only to make less attainable the goal of positive health which they espouse.

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